An Argus Specialist Publication
JUNE 1985
90p

Your COMMODORE

YOUR BEST INDEPENDENT COMMODORE MAGAZINE



Scorching selection of C16 software

Action packed summer holiday to be won

Anirog – the secrets of success

Sun-filled pages of news, reviews and programming tips

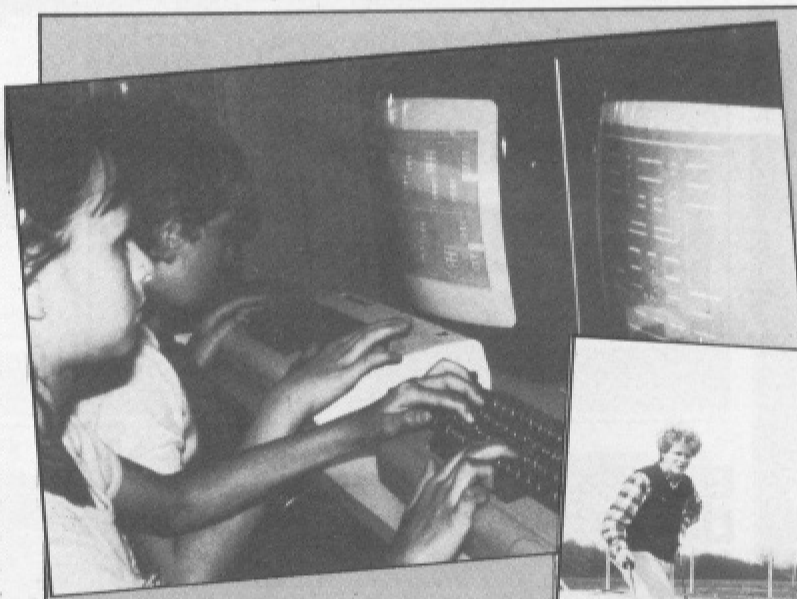
C128 comes out of the shadow

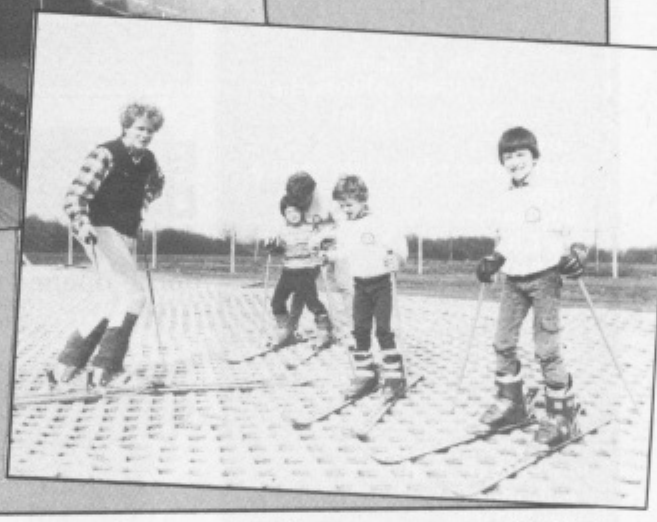
Our COMMENT

NO, IT'S NOT THE YOUR COMMODORE bumper summer annual, even though our cover might mislead you into thinking so. But, with those hot and heady summer days approaching, we hope to show what fun computers can be.

This is a period which has seen the reappearance of the Commodore name in the business market. The 16-bit PC (the PC10 or PC20, depending on whether you opt for a floppy or hard disc version) has been knocking around for a while now and Commodore's darling of the Las Vegas CES show in January, the C128, is due for release pretty shortly. With a machine which is compatible with the 64 and also capable of running under CP/M, Commodore must feel they've got a certain hit on their hands. We'll have to wait and see. In the meantime, read our sneak preview and judge for yourself.

But, for all you pleasure-seeking readers who can't turn your minds to such serious things at this time of year, we're offering welcome release from the daily grind. With our jolly June competition, we hope to get you in the mood for the holiday season.





Computer camps are definitely in vogue. Two which include tuition on Commodore computers in their curricula are Camp Beaumont and Ardmore Adventure. Both incorporate a couple of hours computing a day with sport and creative activities such as drama, video-film making and arts and crafts. These camps are geared to the under 17 year olds but Ardmore do offer weekend or week breaks at Crest Hotels in the Thames Valley, where special courses are offered in computing. Children can stay here with their parents free of charge.

But, these courses can set you back anything from £128 to £188 for a week, depending on where you go. Thank goodness then, that such warm-hearted and generous souls preside at Ardmore Adventure Ltd. They have offered Your Commodore a free week-long residential holiday at one of their computer camps. And because there was so much gnashing of teeth, shedding of tears and general anarchy in the hallowed Your Commodore offices over who was going to take it, and, basically, because we're all well over the age of 16 anyway (even though people tell us we look years younger...), we're giving away our holiday to the lucky Your Commodore reader who wins first prize in our 'holiday of a lifetime' competition! Now, there's a chance you shouldn't miss!

At long last, we've endeavoured to cheer up those readers who, having acquired a spanking new C16 at Christmas, were beginning to think they had a white elephant on their hands. These readers include N. Ciayola from Malta who complains, "I have noticed that most games listings are for the Commodore 64 or VIC 20. Why not some for the Plus/4?" (which is, of course, compatible with the C16), and Mr. A. Beales who asks of the C16, "Is it extinct before it is born?". Well, not only are we treating C16 games freaks to a bevy of software reviews but, for those of you who wish to put your new machine to more constructive use, we've provided your very own assembler to type in.

When we advertised in Your Commodore for reviewers, we were inundated with requests. So many, in fact, that hundreds of you were left disappointed as software houses aren't prolific enough and our magazine isn't large enough to provide enough fodder to keep you all happy every month. But, we're offering a new glimmer of hope to those of you who missed out the first time around. From September, we will offer a prize to the reader who submits the best review of the month, whether favourable or disfavourable, of their latest software purchase. So, get writing!

The time has also come for you to show off your high scores. Arcade supremo, Phil South, might imagine that nobody is faster than him on the joystick-draw, but I'm sure that many of you can deflate his ego. Send in your high scores (witnessed, please)... and, anyone boasting a ridiculously high score will be lured into the labyrinthine lodgings of Your Commodore to prove their case. Be warned!

And finally, let's end on a note of utter confusion and silliness with confusion reigning over the release date of Incentive's game, Confuzion, which they now assure us, is in its final stages and will be up for grabs at the end of May, and the prize for the silliest computer game title of all time going to Zapp Gribbly Grobbly, the latest from the Hewson Consultants factory. Watch this space!



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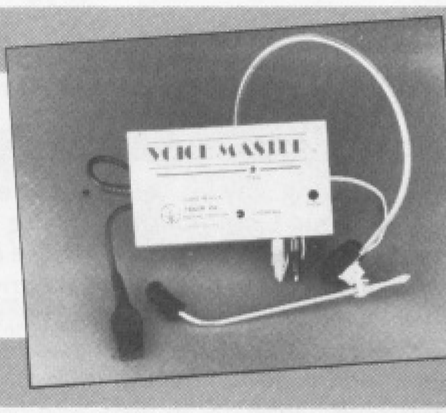
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FEATURES













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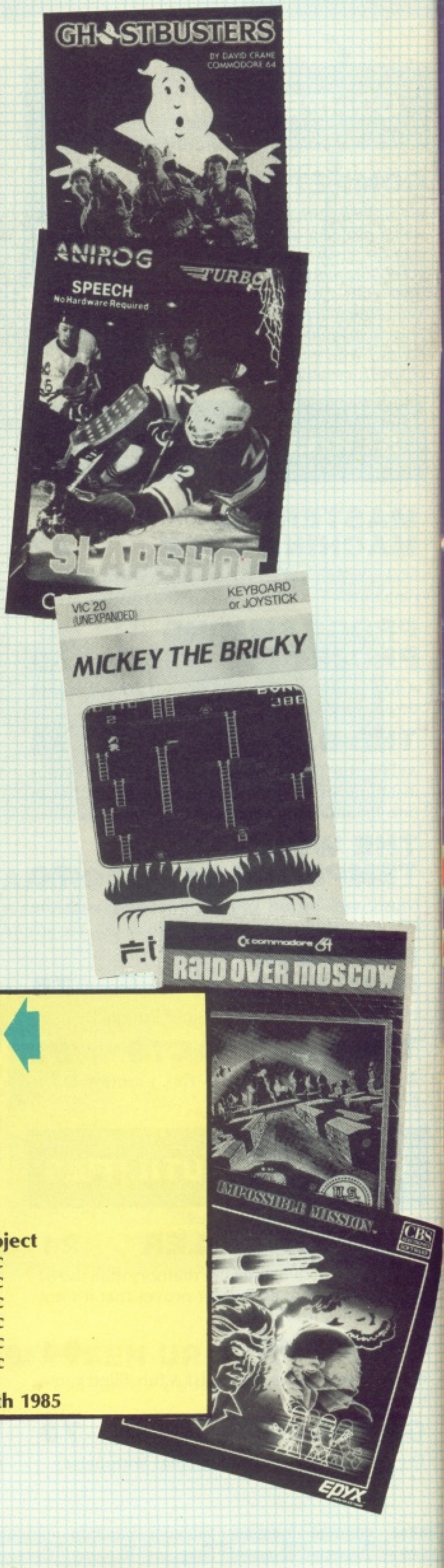
TOP 20 Software

Compiled by Gallup

COMMODORE 64

TITLE		PUBLISHER
1	Soft Aid	Quicksilva
2	Impossible Mission	CBS
3	Pole Position	Atari
4	Ghostbusters	Activision
5	Buck Rogers	US Gold
6	Raid Over Moscow	US Gold
7	Booty	Firebird
8	Rocket Ball	Centresoft
9	Daley Thompson's Decathlon	Ocean
10	Football Manager	Addictive
11	Frak!	Statesoft
12	Combat Lynx	Durell
13	Bruce Lee	US Gold
14	Slap Shot	Anirog
15	Lords of Midnight	Beyond
16	Air Wolf	Elite
17	1985 The Day After	Mastertronic
18	Chiller	Mastertronic
19	Beach Head	US Gold
20	Fighter Pilot	Digital Integration

Retail sales for the month ended March 26th 1985.



VIC 20 Top Ten

TITLE		PUBLISHER
1	Football Manager	Addictive
2	Micky the Bricky	Firebird
3	Hunchback	Ocean
4	Perils of Willy	Software Project
5	Vegas Jackpot	Mastertronic
6	Psycho Shopper	Mastertronic
7	Undermine	Mastertronic
8	Doodlebug	Mastertronic
9	Rockman	Mastertronic
10	Bullet	Mastertronic

Retail sales for the month ended March 26th 1985

Compiled by Gallup for the industry's weekly trade magazine, Computer and Software Retailing. For details contact John Ross, Computer and Software Retailing, 222 Regent Street, London W1R 3AB. 01-434 2131.


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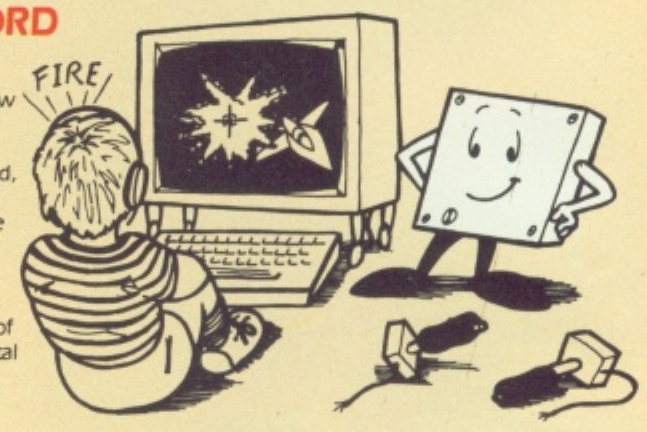




THE VOICE MASTER WORD RECOGNITION

Speech recognition - the technology of tomorrow is available today, enabling you to give verbal commands to your computer. It is very easy to use. Store the words or phrases to be recognised, using the TRAIN command. Give RECOGNISE command and the computer will understand the words it has been trained to recognise.

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THE VOICE MASTER SPEECH SYNTHESISER

THE VOICE MASTER ENABLES YOUR COMPUTER TO SPEAK IN YOUR VOICE IN ANY LANGUAGE AND WITH ANY ACCENT.

The Voice Master Speech Synthesiser

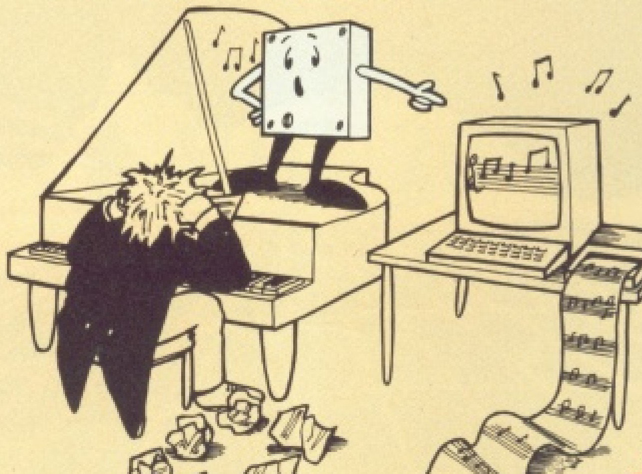
The Voice Master enables your computer to speak in your own voice, in **any language** and with **any accent.**

To record speech, use the command **LEARN** and speak into the microphone. To play back, use the SPEAK command. Up to 64 different words, phrases or sounds can be stored in the computer at one time.

You can control the recording rate, play back speed, and volume for special effects. You can even program to speak backwards.

It is easy to use. Examples are included in the manual to make it easy to add speech to programs.

THE VOICE MASTER - VOICE HARP



Voice Harp is a totally new musical concept With Voice Master powerful software, you can actually compose and perform music in real time simply by humming, whistling or singing. It doesn't matter if you can't read music. Your voice or whistle pitch will write the notes for you including duration and rests.

As you hum or whistle, the notes scroll by on the video display. You can edit the notes, play them back, scroll them back and forth, deleting and correcting them, when finished, the score can be printed out.

In the performance mode, you can change octaves, musical keys or add chords. Even if you can't sing or have a sense of pitch, the VOICE MASTER will show you how easy it is to stay in tune.

OTHER SPECIAL FEATURES

A bar graph display of speech is provided which is similar to a real time spectrograph. Voice fundamental pitch is also shown in real time.

A major advantage of the Voice Master system is that word recognition and speech synthesis can work together.

The Voice Master comes completely with a quality head set microphone and earphone (similar to what telephone operators and pilots use), speech synthesis, speech recognition, voice harp software and detailed instruction manual. Demonstration clock and other programs are included in the software. A detailed manual with examples explain how to use speech synthesis and recognition in your own programmes.

ANIROG

Trade Enquiries

Unit 10 Victoria Industrial Park, Victoria Road, Dartford, Kent DA1 5AJ. Tel: 0322 92513/8

Data Statements

Commodore attack business market

THE LAUNCH OF COMMODORE'S NEW IBM compatible 16-bit PC at the end of March marked Commodore's new offensive on the business market. At a press conference to launch the machine, David Gerrard, the UK marketing manager, presented Commodore's reasons behind launching the new PC while Paul Welch, the UK sales manager, outlined the PC and Commodore's support package.

The PC is available in two models – the PC 10 floppy-disc version and the PC 20 hard-disc version. They are very competitively priced: £1675 for the floppy-disc machine (this is 25% cheaper than the IBM PC) and £2795 for the hard-disc version (cheaper than any other hard-disc PC). The PC 10 has twin 360K floppy-disc drives and five expansion slots and the PC 20 one 360K floppy-disc drive, one 10Mbyte hard-disc and four expansion slots for IBM-type boards. They also feature an optional Intel 8087 floating point processor as well as the 16-bit processor, 256K RAM memory expandable to 640K, parallel and serial



interfaces and GW BASIC.

David Gerrard believes that, with 120,000 users of Commodore business computers in Great Britain, that there are more Commodore micros installed in British companies than any other machine. With the new PC, Commodore hope to maintain and strengthen this hold on the British business market.

A carefully planned marketing policy has been developed to promote the PC. Commodore intend to provide effective support and back-up to both dealers and users. They have set up a specialised business sytems management team which will operate nationally and internationally.

They hope to increase the number of dealers having access to the new PC by establishing a distributor network. This network will comprise five distributors – Norbain Micro Ltd., Northamber PLC, Pete & Pam Micro Distributors Ltd., S.T.C. Electronic Services and Westwood Distributors Ltd. Their dealer support scheme also includes a three-year warranty scheme, a leasing deal, financial back-up and a Commodore hotline.

The response from dealers has certainly been very positive. At the time of the launch there were already 3 months of advance orders.

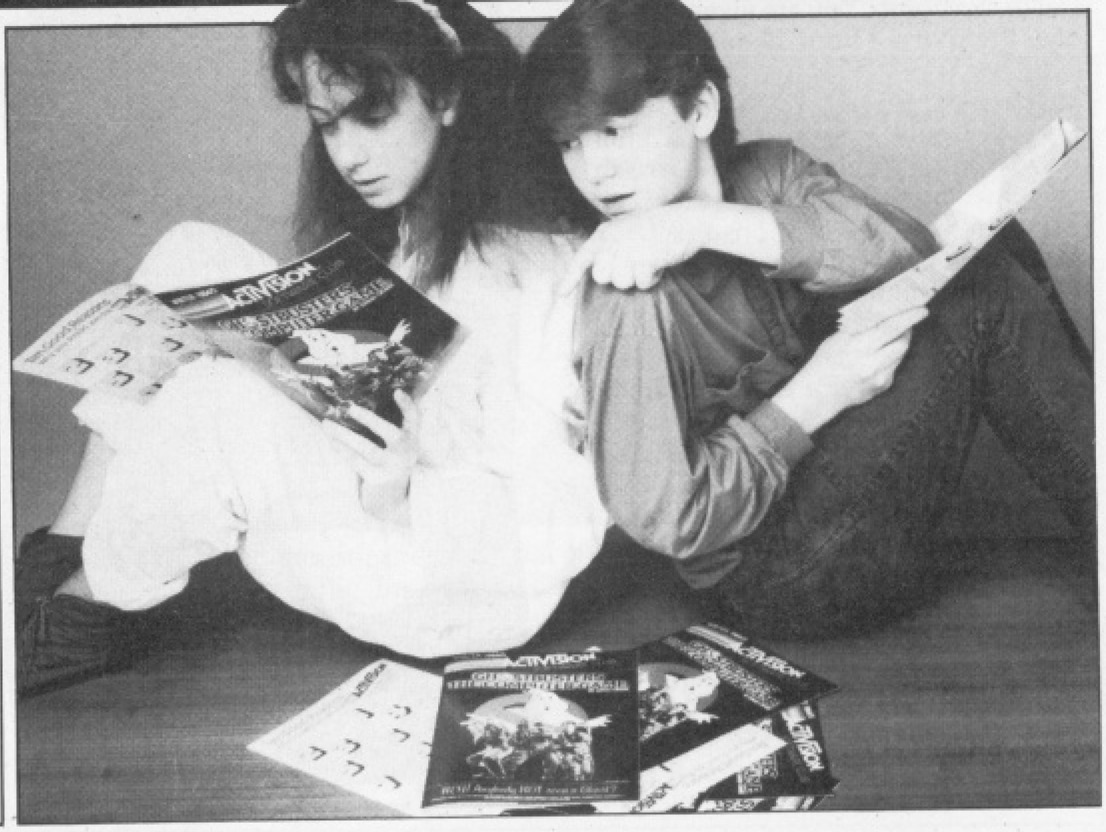
Says Paul Welch, "The PC 10 and PC 20 represent exceptional value for money as they stand – with the comprehensive support package we have built around the machines, we believe they offer an unbeatable deal".

Club spot

- Activision is issuing a free software club magazine, Activision Software Club News. The first 1985 issue is 16 pages long, in full colour and gives information on Activision's latest titles, and carries news, articles and reviews. Anybody contacting Activision may receive a free copy. Activision, 15 Harley House, Marylebone Road, London NW1. Telephone: 01-486 7588.

- US Gold has announced the US Gold Club. For a fee of £9.99 (plus 75p postage and packing), members will receive a US Gold sweatshirt and badge, a poster, membership card, discounts on US Gold software, US Gold merchandise and Gold Bulletin, a regular newsletter containing information on US Gold games.

  US Gold Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham B7 4LY. Telephone: 021-359 3020.



Tinker, tailor, soldier...fire!

WELL, MACBETH AND THE HOBBIT have been immortalised as computer games so why shouldn't slick stories of espionage follow suit? Hutchinson Computer Publishing have released their first computer game. The Fourth Protocol – The Game, based on Frederick Forsyth's novel. Hutchinson also plan to release games based on the Lone Wolf series by Joe Dever and Garry Chalk: Flight from the Dark, Fire in the Water and Lone Wolf and the Ice Halls of Terror. A game based in Len Deighton's Blitskreig is planned for release in the Autumn.

The game is only very roughly based on the book. As M15 investigator, John Preston, your aim is to uncover the plot behind Russia's Plan Aurora and prevent breaching of the Fourth Protocol. If you fail, a nuclear bomb will explode.

There are three parts to the game. In the first, you are using M15's central communications computer, CenCom, and you're surrounded by various pieces of equipment such as a filing cabinet, telephone and calendar, all which play an important role in the game. There are 12 interacting plots going on at once. Some are red herrings, others are crucial and lead to the bomb. You are given 40 days to solve the plot – 1 hour 20 minutes in real time.

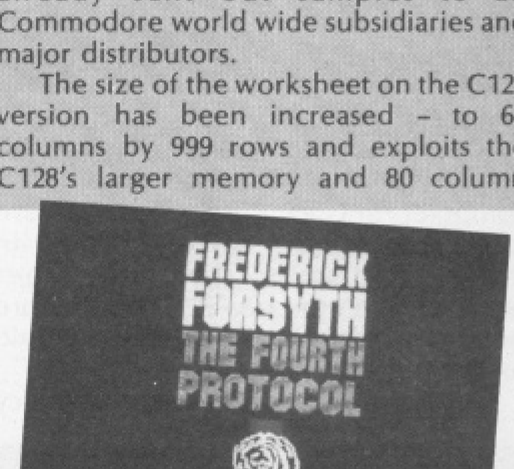
The second part is more straightforward. You'll travel around a limited London underground system in search of the bomb and also visit Dover and Bristol. There are over 200 locations in all. Once again there are red herrings. When you have found the bomb, you get a code to load the final part of the game.

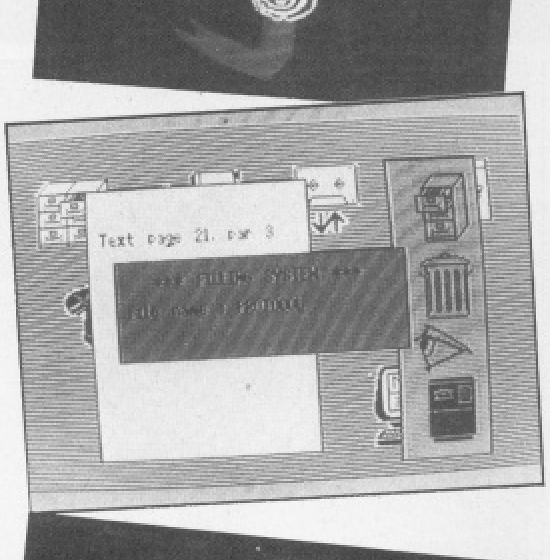
The final part is arcade action. Having found the bomb in a derelict building, you must kill the KGB agents to prevent them halting your efforts to defuse the bomb. Once you enter the building, it's a race against time before you either save the world, if all goes according to plan, or nuke yourself, if it doesn't.

The Fourth Protocol retails at £12.95 (tape) and £15.95 (disc).

Hutchinson Computer Publishing, 17-21 Conway Street, London W1P 6JD.

Roll on the mega-adventure of War and Peace!

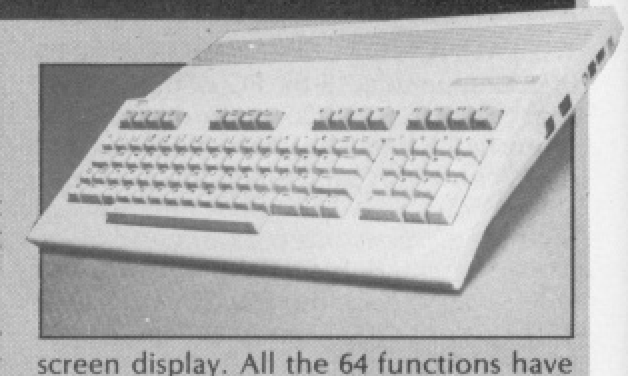






In business

IT LOOKS AS IF THE C128 WON'T BE suffering the same fate as the 16 and Plus/4 machines – ie, lack of available software when the machine is released. Naturally, this is largely due to the fact that the machine is 64 compatible so existing 64 software can be enhanced to take full advantage of the 128's extra power.



Audiogenic certainly don't intend to be left behind in the software race. They have converted their Micro Swift Spreadsheet for the C128 and have already sent out samples to all Commodore world wide subsidiaries and major distributors.

The size of the worksheet on the C128 version has been increased – to 64 columns by 999 rows and exploits the C128's larger memory and 80 column screen display. All the 64 functions have been maintained.

Audiogenic's word processing package, Micro Wordcraft, is now available on cassette. Audiogenic claim that the cassette version retains all the features of the disc version.

Audiogenic Ltd., 39 Suttons Industrial Park, London Road, Reading, Berkshire, RG6 1AZ. Telephone 0734 664646.

Chatty Cheetah

THE LATEST SPEECH SYNTHESISER FOR the 64 comes from Cheetah Marketing. Called The Sweet Talker, it retails at £24.95.

It is a plug-in module which interfaces to the Commodore 64 via the rear port. As an allophone synthesiser, it uses individual speech sounds strung together to make intelligible speech. The package also includes a manual and a demo cassette.

Phonetic sounds are used to program the device. These sounds are sent as numbers to the Sweet Talker in a sequence via a DATA statement. By combining Sweet Talker's range of phonetic sounds, Cheetah claim that almost any word in the English language can be created.

Cheetah Marketing Ltd., 24 Ray Street, London EC1R 3DJ.



Data Statements

A view to kill

SPECIAL AGENT 007 IS TO BE IMMORTalised as a computer game. Domark, the force behind Eureka!, beat stiff competition to acquire the rights to market the computer game version of the forthcoming James Bond movie, A View To A Kill.

They were aided in their bid for the game rights by the game's designers, Chris Palmer and Dave Bishop of Tigress Marketing. Having been approached by Domark with a view to designing the game, Chris and Dave visited Pinewood studios, studied the scripts and story boards and designed an outline of the program. "The people at Pinewood were knocked out", said Chris. It was certainly no easy task. Chris continued, "We had a very finite story from which we had to design a game. With a James Bond film, you always know he's going to live. We had to design a game which maintained the Bond ethos but was still feasible as a game". They claim that a lot of the Bond touches are there, such as the humour element.

Once Domark had acquired the rights, Tigress spent 2 weeks compiling the specifications for the game. They were determined to get it working in their heads before going near a programmer. They worked very closely with the programming house, Softstone, who are also converting Ultimate's Underwurlde to the Commodore 64.

The game's launch is timed to coincide with the release of the film at the beginning of June. It is based around three of the film's action sequences. It is a multiload game comprising three modules each of which form a totally separate game.

A view to kill starts in true James Bond fashion with the silhouetted Bond figure posing with his gun to the accompaniment of Bond music and animated credits. It also features a version of Duran Duran's title song from the movie.

The first module takes place in Paris where baddie, Mayday, has killed someone in a restaurant. Bond pursues her to the Eiffel Tower where she jumps off with the aid of a parachute. You, as Bond, drive around the streets of Paris in a taxi in an attempt to reach her landing spot before she does. You are hampered by the one way system: if you go up a street the wrong way you are hassled by the police. If you fail to reach her, the game transforms into a car chase as you pursue her around the streets of Paris. The screen is divided into two views: a very impressive 3-D view from the taxi as you whizz (or cruise) past buildings or a plan view which scrolls over a map of Paris. Speed limits are imposed and the time and day (the whole game is played in real time) are displayed. I saw this part in its early stages, but was still very impressed. impressed.

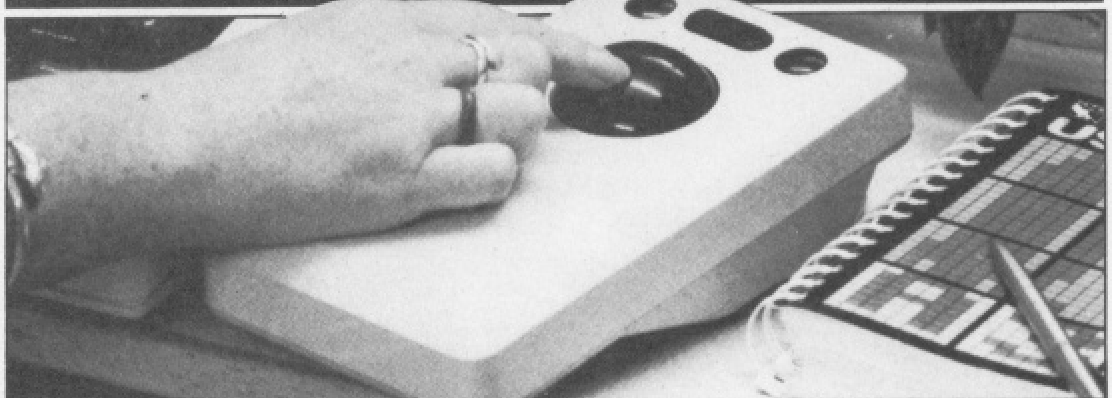
The second part sees our hero, this time with glamour girl accomplice, Stacey, in the City Hall. They have been captured and held there by the evil, Aryan-type villain of the piece, Zorin. Having shot the dignitary, also held in the hall, Zorin forces Bond and Stacey into a lift over which he throws a bottle of flaming bacardi. With the aid of various gadgets, Stacey is recued. You can then use Stacey to help you rescue Bond by asking her to perform various tasks. She can obtain various objects to assist her in her mission via a duck-shoot mechanism whereby she must choose objects as they scroll past. In true arcade adventure style, there are a lot of rooms. Of course, Bond escapes to reappear in the next game.

The final part depicts a mine under Silicon Valley which Zorin has packed full of explosives and a detonator, which Bond and Stacey have to defuse. Explosions in the mine cause flooding and once again lucky old Stacey escapes. Bond teams up with former baddie, Mayday who, like Stacey in the previous game, is rescued in time to help save Bond. Once again, the duck-shoot mechanism is used to acquire various objects to assist her in her task. Bond has the option to defuse the detonator or remove it before time runs out.

Since the game is played in real time, if you complete the first or second game under the allotted time, you have longer to complete the subsequent game.

Although artistic licence has been used here and there, the game apparently sticks very closely to the film. Not having seen the film or the game in full, I cannot confirm this. But I was certainly very excited by what I heard and by the snippets I saw. I'm anxiously waiting to see A View To A Kill – The Game, in it's full glory.

On the right track



Neither joystick or mouse, the Marconi Tracker Ball is a graphic input device providing precise x-y cursor control by simple fingertip operation of the central ball.

Marconi have developed the RB2 Tracker Ball for serious hobbyists, educational purposes and using graphics programs. It comes with a user guide and graphics software as well as software to facilitate linking with the RB2 to users' own programs. There are also other software packages available for the tracker ball, which retails for £59.50.

Further information is available from Central Trade Exchange, Ashton Lodge, Ashton Road, Dunstable, Beds LU6 1NP; Telephone 0582 64334.

Data Statements



From fun to Forth

- Elite has developed a version of their top-selling Spectrum game, Airwolf, for the Commodore 64. This game is the official computer game version of the Universal Studios television series and sold over 50,000 copies on the Spectrum within six weeks of being launched. It retails at £7.95.

  Elite Systems Ltd., 55 Bradford Street, Walsall. Telephone: 0922 611215.

- Creative Sparks are hoping that they won't receive a frosty reception with their new game, Ice Palace. Creative Sparks boast that the game features 'stunning sound effects' and graphics which are 'a masterpiece of fine detail'.

  As the Crown Prince of a frozen kingdom, you must find the seven pieces of your murdered father's crown before the wicked Ice Queen and her servants turn you to their evil ways. The game includes 7 levels and over 1200 rooms. You must collect various objects on your travels to help you in your task. It retails at £7.95.

  Also from Creative Sparks is a C-16 version of Tower of Evil which follows the adventures of Andros on his mission to rescue Diana, the fair princess, imprisoned by a wicked Necromancer. There are over 60 rooms to search and 8 storeys in the Tower of Evil and each storey is inhabited by a different type of ghastly minion. The Tower of Evil retails at £5.95.

- On the more serious side, Melbourne House have released a Commodore version of Forth, C64 Forth+. This high level language will enable the user to run programs up to fifty times faster than those written in BASIC, without having to understand machine language. The language can be re-defined to suit individual programming requirements. It adds to fig-Forth, colour, sprite, sound and graphics instructions. Using it, the programmer can create stand alone programs which can run on the 64 without the need to re-load the initial program. It is also possible to define your own character set. It retails for £14.95.

  Melbourne House, Castle Yard House, Castle Yard, Richmond, Surrey TW10 6TF. Telephone: 01-940 6064.





OUR PICTURES SHOW THE WINNERS OF the John Menzies Young Programmers of 1984 competition (top picture) and the joint Spectrum Group PLC/Commodore Computers competition.

In the top picture, back row, left to right, Tim Hartnell (competition author and judge and author and publisher of Interface Publications); Cathryn Dew (under 12 winner), John Dove (over 15 winner) and Ian McLachlan (John Menzies Development Director). In the front row, left to right, are the 12-15 category winners with leading judge Professor Donald Michie from Edinburgh University. The boys are Stuart Crow, Neil McLennan, Grant Ormsby and Martin Downey.

The bottom picture shows the Haley family, winners of the Spectrum Group plc/Commodore Computers competition, being presented with a cheque for £2,500 spending money as part of a prize of one 14 day holiday in Florida. From left to right on the picture are David Pleasance, National Accounts Manager for Commodore, Mrs. Dorothy Haley, Bob Cleaver, General Manager Spectrum Group PLC, Richard and Stephen Haley, John Greetham, Manager of the Computer Department of Greens of Coventry where the Haleys collected their entry form for the competition and Mr. John Haley.



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ARCHON:

Pete Freebrey squares up to Archon, the computer 'board' game which has enjoyed such success in the USA.

Archon
★ ★ ★ ★ ★
Ariolasoft
CBM 64 + Joystick(s)
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£14.95 — Disc

MANY GAMES THAT USE A BOARD DIVided into squares and 'men' that are not all of the same shape, are compared to the game of chess. The thought of a game that has stood the test of playing over many hundreds of years, being compared with these upstart 'computer games' is in many cases quite odious. On the other hand **Archon** does have rather a lot to recommend it!

Like chess, it may be enjoyed by the novice, even though the player may not fully understand the strategy behind either his, or his opponent's moves for, hidden within this game, are several levels of player/game awareness.

Archon is played on a 'board' with nine squares to a side. As in chess, the two opposing sides start the game by occupying the two rows of squares on opposite sides of the 'board'. Unlike chess, the two sides have different pieces that have different attributes! Also, unlike chess, when one piece challenges another, the display changes to a separate 'battle-screen' where the two fight it out in arcade style combat. You may play (using joysticks) either a human opponent or against the computer.

Each side has a 'Magic User' that has the power to cast spells in addition to having what may be considered to be normal fighting abilities ... for Archon, that is.

Characters each have a maximum number of squares on which that they may move. Some move on the ground and may not pass through other pieces, some have the ability to fly over creatures that are in their way.

The two sides represent the opposing forces of 'light' and 'dark', with the 'board' divided into not only white and black squares but also a number of squares that change colour as the game progresses. The colour of a square that a creature occupies affects its combat potential – with a 'light' creature being more difficult to defeat on a lighter coloured square.

Each side has eight different creatures and each of these has combat characteristics that can affect the game strategy. Knights and Goblins, the 'pawns' of the 'light' and 'dark' respectively, can only fight at close quarters. They can 'hammer away' with their swords and clubs incessantly without apparently taking a breath ... but their lifespan is short and they can inflict only relatively minor damage.

A Dragon lives longer, throws its firey breath at a distance and inflicts great damage, but needs time to 'stoke up' before it can deliver another fire bolt! Unicorns can throw energy bolts at a fairly rapid rate and move quickly but only have an average lifespan. Trolls and Golems are slow but powerful and can take more punishment.

Other creatures include Banshees, Valkyries, Archers, Djinni, Basilisks, Manticores a Phoenix and a Shapeshifter, the latter mimicking the attributes of its enemy! ne a 'Grand Master' at this game.

Finally, we come to the Magic Users – the Wizard (light) and the Sorceress (dark). They both have seven spells which may only be used once. These include fighting an enemy by summoning an Elemental, imprison an opposing piece,

OUR RAVE REVIEW

healing wounds, resurrect a dead creature or reversing the flow of time. This last spell enables them to manipulate the cycle of the changing coloured squares to their advantage.

Five of the squares on the strategy board are defined as 'power points'; he who occupies all five wins – you also win if you eliminate all your opponents.

This is an enjoyable game at whatever level it is played – either as a 'bull in the china shop' thump-up or as a deeper strategic exercise. It is no surprise that this is a very popular game in the USA, or that there is already a sequel – Archon II – adept.

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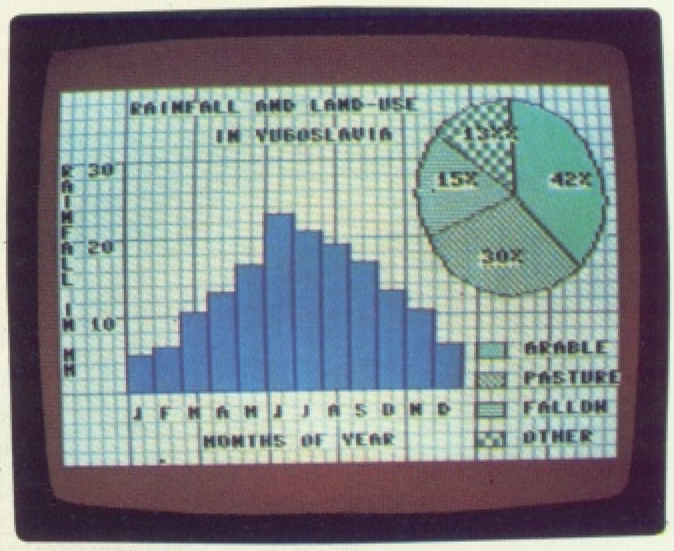
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The graphic above was created using the Super Sketch Software



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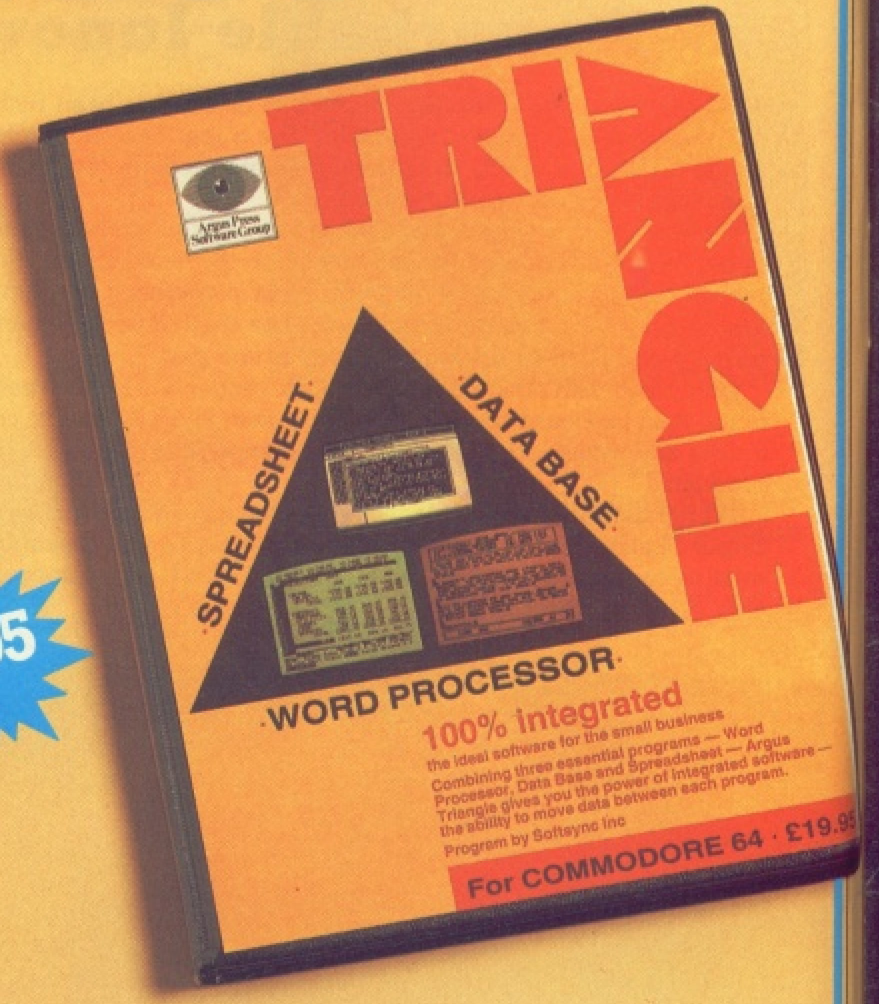
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AVAILABLE FOR COMMODORE 64 WITH DISC DRIVE

Runecaster's vote may be cast firmly in support of text adventures but he also has a couple of graphic adventures tucked up his sleeve. Read what he has to say about them.



In this case MP could well stand for Machine Programmer. What prompts this call to arms (they do you know...), is the back cover of a highly recommended book published by Compute! Books – Compute!'s Guide to Adventure Games' by Gary McGath. There for all to read is a phrase that I endorse completely. 'Words Worth a Thousand Pictures'. This statement is then amplified to make the case for the 'text only' adventure. I can only applaud such a sentiment from such a respected source!

I am not opposed to an adventure having graphics — far from it; some paragraphs further down you will read of two such adventures that have given me a great deal of pleasure. But, in this world of 'financial return', it is all too clear that the sales of a computer game have to be high for a software house to stay in business.

For those sales to reach large enough quantities, a game often has to be 'hyped' beyond its true worth! It is easier to promote ('hype') pictures than it is words. It is also easier for a salesman (or whatever the up-market classification may be!) to quickly demonstrate a game's graphics, than it is to have a potential buyer of thousands of tapes, read a few 'pages' of descriptive text – especially when that buyer may not have an affinity for 'sparkling underground caverns' or 'a curious planet on the outer reaches of the known galaxy'. All I ask, and hope some of you too will ask, is that the evocative wonder of the written word be not entirely ignored.

End of 'cry from heart', back to Compute!'s book. If any of you have had the opportunity to study any publications from this source, you will already know that their standard is high. The price in this country is not cheap but I have never had the feeling that I wished I had saved my money!



'Compute!'s Guide to Adventure Games' has some 200 pages and twelve chapters. Initially the reader is taken through the adventure game's beginnings and details of what makes a good adventure game. Next, three chapters on popular adventures give a brief summary of the highlights of a number of them. Although the book is written for initial distribution in America, many of these games are now available in the UK.

Other topics include 'A Field Guide for Frustrated Adventurers', 'How They Work' and 'Doing Your Own'. These are three particularly well written chapters that can only enhance your understanding of the genre.

'Tower of Mystery' is a simple adventure game for you to type in should you feel so inclined. This is neither a complex program· nor a difficult adventure and may be recommended to the novice adventurer. The final chapter looks to the future and tries to anticipate what we will be seeing in the months/years to come.

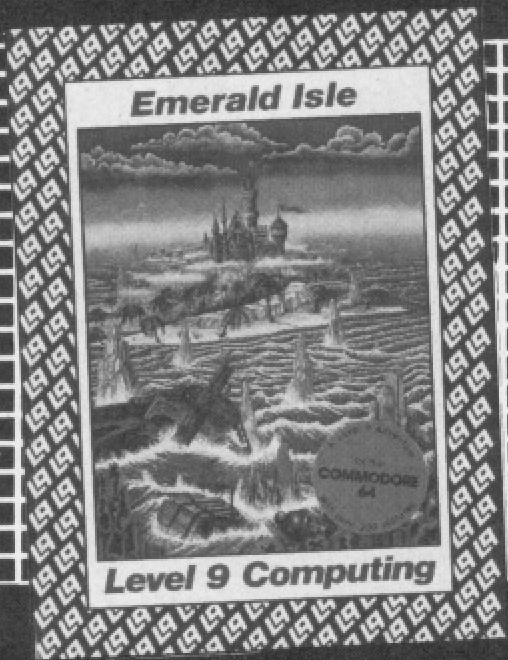
The 'Guide' is a very readable book and, if you have the spare time between adventures, is to be recommended. It is

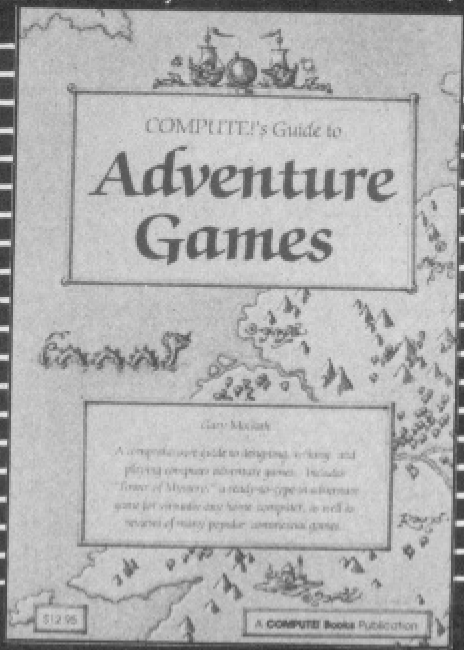
distributed in England by Holt Saunders Ltd, 1 St Anne's Road, Eastbourne, BN21 3UN and should be available in the better bookshops, cost £10.95. Holt Saunders have a good range of computer titles and it may well be worth your while obtaining their booklist.

Another from the USA

If you are into American adventure games — Zork, Deadline, Suspended, Enchanter, Starcross, Nemesis, Oubliette or Wizardry — then you may like to consider another of the books in Holt Saunders list: 'Conquering Adventure Games' by Carl Townsend, published by dilithium Press; price £11.95. It is well written and makes interesting reading. Other games are mentioned but those above receive a more in depth analysis.

Not all the puzzles are solved for you, merely a number of 'hinge' points to help you continue. Even then the clues are not spelt out in plain English — your first task is to decipher the encrypted messages! Each game uses a different cyper too. Check out this book.





Home-brew witch

'The Witch's Cauldron' for the CBM 64, by Micro-Gen, is an illustrated adventure that has a fresh approach, is fun to play, humurous, with ultra-fast graphics, a good command analyser and is not too easy.

In brief, you have incurred the wrath of the Wicked Witch (née Hazel!). This has resulted in what may be considered as 'par for the course' — you have been transformed into a lowly green TOAD!

Your mission, should you accept it or not (!), is to regain your normal human form. This you can do by making use of appropriate spells or potions to be found in and around the Witch's somewhat superior hovel. In other words, there are lots of rooms for you to explore in order to find the ingredients!

But, one transformation will not be enough! There are even hints that up to thrice times ten changes may be necessary. Don't ask me to verify this — I've only just manage to progress from an ape!

'The Witch's Cauldron' uses a 'rapid load' system (Hyperload), so loading time is cut to just about five minutes. You start your search for the means to change shape in the Witch's Parlour. On screen you will see various items or furniture and — sitting quietly somewhere — a cute green toad!

The initial action takes place in this one room. You may move from place to place, either by expressing directions NORTH, EAST, UP, etc., or just by saying where you want to go - COUCH, CHAIR etc. This latter form of movement control is not always successful and I suspect is purely a quirk of the command analyser.

Input commands may be quite complex such as ' UNLOCK THE DOOR WITH THE SILVER KEY' and 'GIVE THE WOMAN THE GOLD CHAIN'. Shortened forms of words are usually recognised but do not use less than the first four letters of a word; some strange things may happen if you do! Not necessarily harmful, just unexpected. The program is just doing its best to understand an imperfectly worded command. At least this is better than some programs thay keep saying 'Huh?'

First of all, you must change into a cat. This you do by — (you didn't really expect me to carry on did you?). Having made this giant first step, furture changes are carried out by making a potion in the Witch's Cauldron and drinking it! Clues abound but, if you are really baffled — HELP will often do just that — albeit in a rather cryptic fashion.

The graphics are clear and succinct and add greatly to the adventure. Text is kept pretty short, relying on the pictures to set the mood for any scene. This they do well, striking an excellent balance between detail and mystery.

Some may call them sparse but, to my mind they clearly show what is necessary to sustain interest whilst leaving your imagination to supply the rest. Pictures are 'drawn' by 'blocks' to the screen and so appear very rapidly.

Fortunately, you may SAVE your character and position within the game. This is carried out at 'Hyperspeed' so may be repeated often with hardly any loss of playing time.

The first two transformations are not difficult — once you begin to get a feel for the program. Once past these you will encounter the largest 'maze' you would have yet met. It is not exactly a maze in the accepted sense, rather a complex location pattern with no points of reference. You certainly cannot carry enough items to drop in order to map it in the ordinary way. Once you recognise you have found it (!) just keep your head and, if you did not already have paper and pencil to hand, go and get them now!

Micro-Gen's latest is one of those unexpected finds that will give a great deal of fun to both beginner and expert alike.

Latest from the top

Level Nine Computing are in an enviable position with their followers just waiting for the next offering to 'snap up' as it appears. Such is the well earned reputation of one of our top adventure software houses.

'Emerald Isle' has, at long last, arrived. It follows Level Nine's latest pattern of text and graphics as has been seen in 'Return to Eden'.

Here the graphics drawing routines appear to have been speeded up slightly but as they use a 'draw and fill' technique, there is a slight but noticeable pause whilst they are 'drawn'. The time varies depending upon the complexity of the picture but is usually only between five and ten seconds.

The program uses a fast loading system and takes only 2¼ minutes to load. You

may SAVE nd RESTORE your character and game position; this takes about 40 seconds, which is not long to wait for the knowledge that you have a secure base to return to — should something go ammis.

'Emerald Isle' returns to the basic theme of some of their earlier adventures, where the aim is to collect 'treasures' rather than have a finite purpose such as in 'Erik the Viking' or 'Snowball'. The scene is set — surprise, surprise — on an island. You have just arrived by parachute and are swinging gently by its cords high up in the trees.

The parachute came as a surprise since I had expected a more medieval plot, perhaps even within the realms of Irish mythology. I had even swatted up on this mythos — just in case! Oh well, perhaps next time.

The plot thickens when you find yourself in an aerial, wooden city, built up at tree-top level. There are plenty of locations for the newcomer to 'Emerald Isle' to explore. Lots of potentially useful items to collect and also a selection of Level Nine's oddball puzzles to solve.

Two rather nice posters come with each game. Before you stick these up on your wall, look on the reverse of the one showing 'Emerald Isle': Here be the instructions. These are fairly rudimentary compared with some of Level Nine's previous games but are probably all that is needed.

There is also a map of the island on the back of the poster. This may not be completely accurate . . . at least one of the locations shown does not appear to exist, but at least it gives you some idea of what you have yet to see!

Your aim is to collect all the treasures that may be found on the island. There are twenty of these to ferret out and you have to determine what is or is not a 'treasure'! But, take heart; most will be obvious once you have found them and anyway you can always check by keeping a close watch on your score.

This game is not too complex, but has some 200 locations and about 240 pictures! The CBM 64 version still has that range of descriptive text that has become the hallmark of all Level Nine's adventure games.

Make no mistake, this game in common with previous offerings from the same source, is intended to keep you guessing for days if not weeks! It is a 'seeking' game that should appeal to most grades of adventurer. It is also a 'kindly' game – if you die along the way, all is not completely lost, you will be resurrected to try again.

Yet another cave

Most present day adventurer's will probably be fed up with hearing about the grandfather of adventure games – 'Adventure' – also known as 'Colossal Cave'. Variants of this game have been produced for almost every micro.

The CBM 64 has had two for some time, one by Level Nine and the other by Melbourne House – both respected purveyors of good software. To these must now be added a third. This time from Ducksoft, the software arm of Duckworth – publishers of a number of computing books.

It is somewhat surprising that a software house should pin its hopes on such a revival when two versions are already on the market. Having said that, I would still recommend that all adventure players have at least one version of this undoubted classic in their collection.

So what is this 'Colossal Cave Adventure' like? It is said to be the original Crowther and Williams mainframe version. There are presumably different 'original' versions because my treasured map of 'Adventure' does not help in this game's mazes!

This implementation has been programmed by Peter Gerrard, well known for his books on the CBM 64. It uses no rapid load system and consequently takes rather a long time to load – about 14½ minutes. After 3 minutes you are asked if you want instructions. These are presented in a fine gothic (?) script, a little difficult to read but they look great!

These 'on screen' instructions tell you very little but do follow the original pattern. One point to watch is that the command analyser does not accept complex sentences and consequently to travel north-east, you must use the shortened form NE or otherwise the program will look on NORTH-EAST as NORTH.

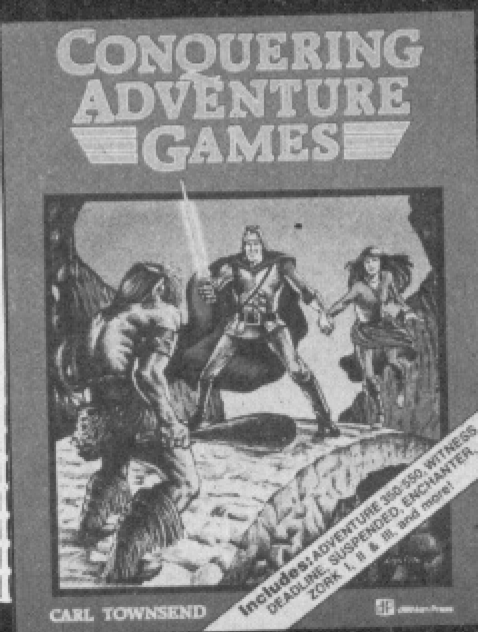
One interesting aspect of this input routine is the facility (sometimes) to travel to a location by simply typing in your chosen destination. Hence, if you are above ground and not lost in the woods you can travel directly to the well-house by just typing BUILDING.

Once the main program has loaded you return to the normal CBM script – so there is now no excuse for misunderstanding the text! The choice of colours both for text and background make this version easy to read and understand.

That about sums up this game's good points. Its bad points are so bad that I feel that you would be wise to purchase one of the other two CBM 64 versions! There is no SAVE facility that I can find and on a game such as this has got to be a major drawback.

If you feel that things have got beyond your control DO NOT type in QUIT, hoping to start again: with no warning or request for confirmation the program is NEWed and you will have to wait a further 14+ minutes for it to load back in!

Likewise, if your lamp runs out, you are told your score and the program returns you to the Commodore 'cold start' screen. Having had this sort of thing happen a couple of times, I'm afraid I lost patience and mentally chucked this program in the bin! Both Duckworth and Peter Gerrard in particular should know better; what a disappointment.





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With this assembler from Joe Nicholson, you can, at last, put your C16 to serious use.

C16 Assembler

AN ASSEMBLER IS THE machine code programmer's most important utility, as it converts assembly language instructions into machine code, the microprocessor's own language. The C16 has an excellent built-in monitor including a simple 'line' assembler. However, as this assembler does not store text in memory there is no way of editing the instructions. Also, it lacks labels which are very useful in branching and structured programming. In practice, a line assembler is tedious to use for all but short machine code routines and, as a machine code programmer myself, I urgently needed an assembler for the C16, so I decided to write my own.

This article describes a two-pass assembler which has the ability to handle labels and relative jumps. It can also produce machine code to run from a different starting address — useful if the assembler occupies a region of memory you wish to use in your program. Note that data and addresses can be entered directly in decimal, or in HEX if preceeded by a $ sign. For a detailed description of the 6502 instruction set the reader is referred to one of the standard works on the subject such as 'Programming the 6502' by Rodnay Zaks, or the 'Mastering Machine Code' series in this magazine.

Figure 2. Assembler directives.

ORG address	Specifies the starting address of the assembled code.
TRU address	used after ORG. Although ORG specifies the location in memory of the assembled code, TRU enables you to assemble the code to run from a different address.
Text string of characters	This allows text to be put into the assembled code at that point.
BYT number (,number ,number...)	This allows a series of data bytes to be put in at that point.
END	Informs the Assembler that it has reached the last line of the assembly program and must be the last line of the text. It may also be placed inside a program to stop assembly at a given point (useful for testing code).
; (semi colon)	Informs the assembler that all characters following on this line are not to be assembled. Similar to the BASIC REM statement.
: (colon)	The colon precedes all labels. The assembler can handle up to 100 two byte labels.
= (equals)	This allows you to define labels as constants, eg. to set the label ab to 320, type ":AB=320".
R	Relative jump — on a line containing a relative jump, the label of the address to be jumped TO must be preceeded by an R.

Directives.

There are a number of directives which the assembler recognises in addition to the 6502 nmemonics. These are set out in Figure 1.

Writing Text

The text is stored in DATA statements as this has several advantages, i.e. text is not lost when editing the instructions and there is no need for a separate line editor making the assembler program shorter — an important consideration when writing for the C16. Text is stored from line 10000 onwards. To simplify entering text lines, two keys have been redefined:

F2 prints DATA'' which combined with the use of the AUTO command greatly facilitates text entry.
F3 lists the assembler text area.

Assembler's own commands

There are several commands recognised by the assembler which can be used to get professional listings, print symbol tables etc.

A or ASSEMBLE
An obvious one this! The assembler prints the pass it is on and does it's best to convert your instructions into machine code. If there is an error in the list, eg, LABEL NOT FOUND or RELATIVE JUMP OUT OF RANGE, it will print the error and the line number where the error was spotted. When assembly is complete the computer will display>>OK and a flashing cursor.

L or LIST
When this command is used it prints START:? Enter the line number you want the listing to start from and press<RETURN>. The program will list until it reaches an END instruction or until you press any key.

P1 — Turn on printer.
All output in the program is directed to the Commodore-1520 printer-plotter. Output can be directed to other printers by changing the OPEN command in line 2000 from channel 6 to the required channel.

P0 - turn off printer.

All output returns to the screen.

S or SYMBOL
Used after assembling — prints a table of all the labels and their addresses.

Q — Quit assembler.
Saving and loading text is done by the normal SAVE and LOAD commands in BASIC. To save code use the S and L commands inside the machine code monitor which can be entered by typing MONITOR or M (shift 0).

Description of BASIC program.

The program occupies about 3300 bytes. When entering some of the longer lines it is necessary to use abbreviated commands, such as '?' for PRINT, to avoid exceeding the line length limit of the screen editor. The main functions of the assembler program are as follows:

Line 10
Jump to initialise.

Lines 100-140
Read a number/label in dec/hex.

Lines 200-250
Find next instruction and sort into operation (C$) and operand (D$). Find the line number 'DATA' is on (H).

Lines 400-430
'BYT' instruction execution loop. Read numbers from list one at a time and POKE numbers into memory. Signify 'BYT ERROR' if syntax error in number list.

Lines 500-580
Find addressing mode of instruction. K wil equal: 1 for implied addressing, 2 for immediate addressing, 3 for accumulator addressing, 4 for indirect addressing (only used in the JMP instruction), 5 zero page indirect X addressing, 6 zero page indirect Y addressing, 7 absolute indirect X addressing, 8 absolute indirect Y addressing, 9 relative addressing, 10 (indirect), Y addressing, 11 (indirect,X) addressing, 12 zero page addressing and 13 for absolute addressing.

Lines 800-860
Read number. If it is a label, find the label. If the label does not exist print 'LABEL NOT FOUND' and treat number as a 0.

Line 900
Define variables used in the program and the user defined keys, ie:

L$ – the names of the labels.
L% – the addresses of the labels.
Key 2 is defined as DATA".
Key 3 is defined as LIST10000-.

Lines 1000-1010
Input command. Exit if Q is inputted.

User commands:

Line 2000# Turn on printer.
Line 2040 #Turn off printer.
Lines 2070# LIST.
Line 2080 #SYMBOL.
Line 2100# ASSEMBLE.

Lines 2700-2780
LIST command routine — Disable 'GETA$' if printer being used.

Lines 5000-5110
First pass control.

Lines 5500-5530
Second pass control.

Lines 7000-7020
Define a label.

Handle directives:
Line 8000 'ORG'
Line 8010 ';'
Line 8020 'TRU'
Line 8100 'TEX'
Line 8150 'BYT'

Lines 9000-9240
Find command with appropriate addressing mode in table.

Line 9300
'POKE' command into memory.

Lines 9370-9480
Process data bytes (if any) for addressing.

Lines 9500-9690
Command table. This must have the line number specified as there is an increment of 10 for each letter of the alphabet starting from 9000.

Line 9999
An essential dummy line.

Line 63000
An automatic end instruction.

Example.

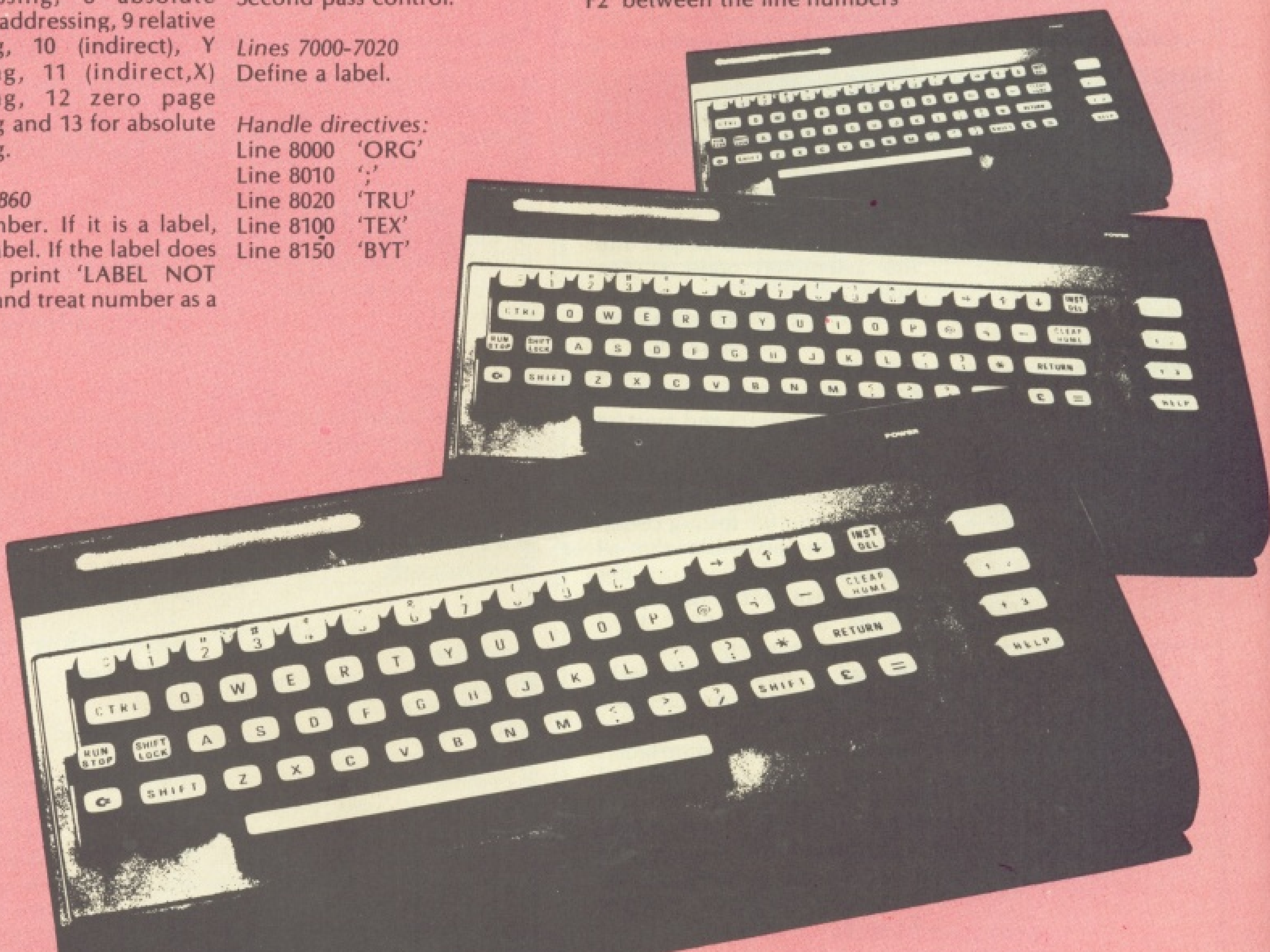
Here is a demo program. If you haven't done so already, RUN the assembler and then Quit to define the function keys. Press 'F2' between the line numbers and the instructions, ie line 10000 should look like this:

10000 DATA";ZOOM

Use the 'AUTO 10' command from line 10000 onwards. It is assumed that line 63000 contains 'DATA"END'.

Remember to SAVE the assembler before executing this demo program (it may not work!). To run the demo quit the assembler and type 'SYS1536'. You should hear a ZOOM sound. If you don't, check the text and assemble again. If it still doesn't work there could be a mistake in the main assembler program (or you could have forgotten to turn up the volume control on the TV set!).

To change the sound to one resembling a rocket taking off, alter line 10120 to: DATE"LDA #4F and re-assemble. If you can't see why this routine works, don't worry, I am planning some articles on the internal workings of the C16.



Program Listing

```
READY.

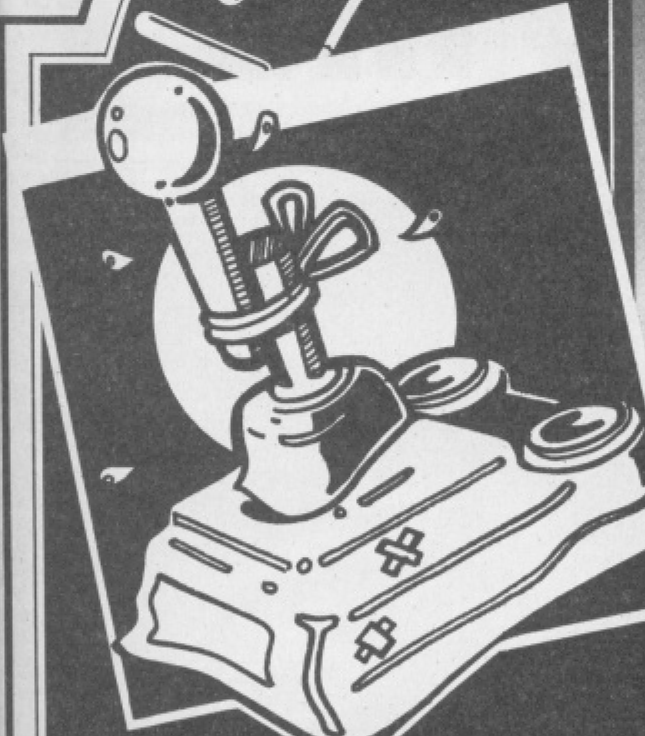
10 GOTO900
100 E=0:B=0:I=0:E$=""
110 D$=MID$(A$,A,1):IFD$=B$ORD$=""ORD$=" "THENRETURN
112 IFD$=":"ORE=2THENE$=E$+D$:E=2:GOTO140
113 IFD$>"/"ANDD$<"G"THEN130
114 IFD$="("ORD$="#"THEN140
115 IFD$="$"THENI=1:GOTO140
120 E=1:RETURN
130 IFI=0THENB=(B*10)+VAL(D$):ELSEB=(B*16)+DEC(D$)
140 A=A+1:GOTO110
200 READA$:IFA$="END"THENRETURN
210 IFA$=""ORASC(A$)=59THEN200
250 C$=LEFT$(A$,3):D$=RIGHT$(A$,LEN(A$)-3+(LEN(A$)>3)):H=PEEK(63)+256*PEEK(64):R
ETURN
400 A$=D$:B$=","
410 GOSUB100 .
420 IFE=1THENPRINT"BYT ERROR IN "H:RETURN
430 POKED,B:D=D+1:S=S+1:A=A+1:IFD$=""THENRETURN:ELSEGOTO410
500 K=1:A$=D$:IFA$=""THENRETURN
510 Q$=LEFT$(A$,1):IFQ$="#"THENB$="":K=2:GOTO800
520 IFQ$="A"THENK=3:RETURN
530 IFRIGHT$(A$,2)="X)"THENB$=",":K=11:GOTO800
540 IFRIGHT$(A$,1)="Y"ANDQ$="("THENB$=")":K=10:GOTO800
550 IFRIGHT$(A$,1)=")"ANDQ$="("THENB$=")":K=4:GOTO800
560 IFRIGHT$(A$,2)=",X"ORRIGHT$(A$,2)=",Y"THENB$=",":K=5+(RIGHT$(A$,1)="Y"):GOTO
800
570 IFQ$="R"THENA=A+1:K=9:B$="":ELSEK=12
800 GOSUB100
810 IFE<>2THENGOTO870
820 IFP=1THENB=0:GOTO870
850 FORI=0TOT:IFRIGHT$(E$,2)=L$(I)THENB=L%(I):GOTO870
860 NEXTI:PRINT"LABEL NOT FOUND IN"H:B=0
870 IF(K=5ORK=6ORK=12)AND(B>255ORE=2)THENK=K+1-(K<12)
880 RETURN
900 CLR:DIML$(100):DIML%(100):KEY2,"DATA"+CHR$(34):KEY3,"LIST10000-"+CHR$(13)
1000 INPUTA$:IFA$="Q"THENEND
1010 A=1
2000 IFA$="P1"THENU=1:OPEN4,6:CMD4:PRINT:GOTO1000
2040 IFA$="P0"THENU=0:PRINT#4:CLOSE4:GOTO1000
2070 IFA$="LIST"ORA$="L"THENGOTO2700
2080 IFA$="SYMBOL"ORA$="S"THENPRINT"SYMBOL TABLE":FORG=0TOT:PRINTL$(G)"     AT:"L
%(G):NEXT
2100 IFA$="ASSEMBLE"ORA$="A"THEN5000:ELSE1000
2700 G=0:INPUT"START:";G:IFGTHENRESTOREG:ELSERESTORE9999
2750 READA$:IFA$="END"THENPRINT">> OK.":GOTO1000
2760 PRINTPEEK(63)+256*PEEK(64)" "A$
2770 IFU=0THENGETA$:IFA$<>""THEN1000
2780 GOTO2750
5000 PRINT"█ASSEMBLE":PRINT"█1ST PASS":T=-1:D=0:S=0:P=1:RESTORE9999
5100 GOSUB200:IFA$="END"THEN5500:ELSE7000
```

```
5110 GOSUB8000:RESTOREF:READA$:GOTO5100
5500 PRINT"■2ND PASS":D=0:S=0:P=2:RESTORE9999
5510 GOSUB200:IFA$="END"THENPRINT">> OK.":GOTO1000
5515 IFMID$(A$,4,1)="="THEN5510
5520 IFASC(C$)=58THENC$=LEFT$(D$,3):D$=RIGHT$(D$,LEN(D$)-3+(LEN(D$)>3)):GOTO5520
5530 GOSUB8000:RESTOREF:READA$:GOTO5510
7000 IFASC(C$)<>58THEN5110
7010 T=T+1:IFT>100THENPRINT"TOO MANY LABELS AT "H:GOTO1000
7013 L$(T)=RIGHT$(C$,2)
7016 IFMID$(A$,4,1)="="THENB$="":A=5:GOSUB800:L%(T)=B:GOTO5100
7020 L%(T)=S:C$=LEFT$(D$,3):D$=RIGHT$(D$,LEN(D$)-3+(LEN(D$)>3)):GOTO5110
8000 A=1:B$="":F=H:IFC$="ORG"THENA$=D$:GOSUB100:D=B:S=B:RETURN
8010 IFASC(C$)=59THENRETURN
8020 IFC$="TRU"THENA$=D$:GOSUB100:S=B:RETURN
8100 IF C$="TEX"THENFORB=1TOLEN(D$):POKED,ASC(MID$(D$,B,1)):S=S+1:D=D+1:NEXT:RET
URN
8150 IFC$="BYT"THENGOTO400
9000 GOSUB500
9100 RESTORE9500+((ASC(LEFT$(C$,1))-65)*10)
9110 READF$
9120 IFLEFT$(F$,2)=RIGHT$(C$,2)THEN9200
9130 A=INSTR(F$,",",3):IFA<>0THENF$=RIGHT$(F$,LEN(F$)-A):GOTO9120
9140 IFRIGHT$(F$,1)="←"THENPRINT"SYNTAX ERROR IN "H:RETURN:ELSE9110
9200 FORI=3TOLEN(F$)STEP3
9210 E$=MID$(F$,I,1):IFE$<"0"ORE$="←"THEN9240
9220 IFDEC(E$)=KTHEN9300
9230 NEXTI
9240 PRINT"ADDRESSING MODE ERROR IN "H:RETURN
9300 G=DEC(MID$(F$,I+1,2)):POKED,G:D=D+1:S=S+1
9370 IFK=2ORK=5ORK=6ORK=11ORK=10ORK=12THENPOKED,B:GOTO9480
9380 IFK=7ORK=8ORK=13ORK=4THEN9450
9400 IFK<>9THENRETURN
9405 IFP=1ORB=0THENGOTO9480
9410 I=B-S-1:IFI<0ANDI>-129THENI=256+I
9420 IFI<0ORI>255THENPRINT"RELATIVE JUMP OUT OF RANGE IN "H:I=0
9430 POKED,I:GOTO9480
9450 POKED,B-(INT(B/256)*256):POKED+1,INT(B/256):S=S+2:D=D+2:RETURN
9480 D=D+1:S=S+1:RETURN
9500 DATA"DCD6DC6526977D879B61A71575
9502 DATA"NDD2DC2522973D839B21A31535
9504 DATA"SL30AD0EC0671E516←
9510 DATA"CC990,CS9B0,EQ9F0,ITD2CC24,MI930,NE9D0,PL910,RK100,VC950,VS970←
9520 DATA"LC118,LD1D8,LI158,LV1B8,MPDCDCC52C97DD8D9BC1AD15D5
9522 DATA"PXDECCE42E0,PYDCCCC42C0←
9530 DATA"ECDCECC67DE5D6,EX1CA,EY188←
9540 DATA"ORD4DC4524975D859B41A51555←
9580 DATA"NCDEECE67FE5F6,NX1E8,NY1C8←
9590 DATA"MPD4C46C,SRD20←
9610 DATA"DADADCA52A97BD8B9BA1AB15B5
9612 DATA"DXDAECA62A28BE6B6,DYDACCA42A07BC5B4,SR34AD4EC4675E556←
9630 DATA"OP1EA
9640 DATA"RAD0DC0520971D819B01A11515←
9650 DATA"HA148,HP108,LA168,LP128←
9670 DATA"OL32AD2EC2673E536,OR36AD6EC6677E576,TI140,TS160←
9680 DATA"BCDEDCE52E97FD8F9BE1AF15F5,EC138,ED1F8,EI178
9682 DATA"TAD8DC8579D899B81A91595,TXD8EC86696,TYD8CC84594←
9690 DATA"AX1AA,AY1A8,SX1BA,XA18A,XS19A,YA198←
9999 REM
63000 DATA"END

READY.
```



I.N.A.R.C.A.D.I.A







Phil South does a spot of hero-worshipping while ambling through the LET show.

SO, THERE I WAS, AT THE LET '85 SHOW, with a sharp pencil, and the gleaming whiteness of the first page of my new reporter's pad blinding me and a few innocent passers-by. I was there to interview David 'Pitfall and Ghostbusters' Crane. I was late, though, and had to come back much later to get my interview.

Blast! I had a stinking cold, and now I had to spend all day at this lousy show. I decided to stroll around a bit and look at what was on display. Nothing much, I guessed.

Flippin' heck! The place was teaming with celebrities; Kevin Toms of Football Manager fame brushed past me, on his way to the well stocked bar I suspected, judging by the way his tongue was dragging on the floor. Then I bumped into some guy with long hair and a beard, busily restarting a computer that had just crashed. I was about to say "Oi, hippy, get yer 'air cut" in mimicry of my arcade hero Jeff Minter on the title page of Psychedelia, when I realised... this WAS Jeff Minter.

"Excuse me," I said boldly but unoriginally, "Are you Jeff Minter?"

"I have that dubious privilege, yes" he said. The conversation thus begun. I wasted no time in praising his many games and the unclassifiable Psychedelia.

Then he took me over to a Commodore 64, on which was running his new game, Mama Llama, featuring his new favourite character, Rory the Savage Guineapig. "Mama Llama is a sort of crazed, freeform videogame," he explained, "not really like anything I've done before. It features many different planets, different gravities, and all the characters have inertia ... more realistic like that!" He went on further to demonstrate the method of entering the game at any level, a sort of grid affair, and gave me a quick demo of Rory's part in the game. "I'm going to give Rory a game of his own next, I think. He's been the baddy for a while now, and I reckon he deserves a crack at being the hero."

Where did Rory come from? "Oh, someone wrote in to me and said could their guineapig be in my next game. I thought, Rory the guineapig... hmm, doesn't sound very menacing. But Rory the *savage* Guineapig, now there's a concept!"

Games worth a mention from the LET show are: Gryphon (Quicksilva), a fast, graphically superior cartoon/arcade game; Master of the Lamps (Activision) a marvellous 3D jape of Aladdinesque codebusting; Dropzone (US Gold) a neat Jetpac/Defender combo and Sorcery (Virgin) a sort of arcade/adventure, with a sort of arcade/adventure, with startlingly good graphics, more of a cartoon really.

Question time

Somebody asked me where I got the name Flippo. Simple! It's a strangulation Philip, which I use on the hi-score tables of arcade machines I visit. Look out for me.

The only hi-score I can present you with this month is my current for CBS' fantastic Impossible Mission – 2500. About an hour and three quarters went into that, so I think you owe it to me to try and better it!

That's all for now: this is the everzapping Flippo, signing off.

Dave Crisp gets to grips with a couple of numeric keypads and some new joysticks.

PUSH ME, PULL ME

NUMERIC KEYPADS ARE A BOON TO anyone who enters a lot of numeric data into their computer, whether for business or programming. Many larger computers and some of the Japanese machines have them as standard but 64 users will have to buy them as add-ons. We look at two of the numeric keypads available.

Voltmace

This keypad consists of 16 keys; 0-9 are marked with the remainder left blank. This is so each key can be programmed to make it possible to customise the pad according to which piece of software you are using. This is done via a machine code routine which requires loading each time you use it. You may get conflict between the code used by the program and the code within your software. Although there is little to be done about this, problems are rare. The software provided for customising the keypad is easy to use and will save a small routine to tape or disc; this can then be loaded from within your home written programs.

The actual keypad plugs into the two joystick ports. The programmable keys were very useful; with a little thought, a lot of time and keypresses could be saved to access things like the $ sign. This made loading directories, etc, faster.

This is a very useful add-on. It's a shame that you need to load software to use it each time but that's the price you pay for versatility.

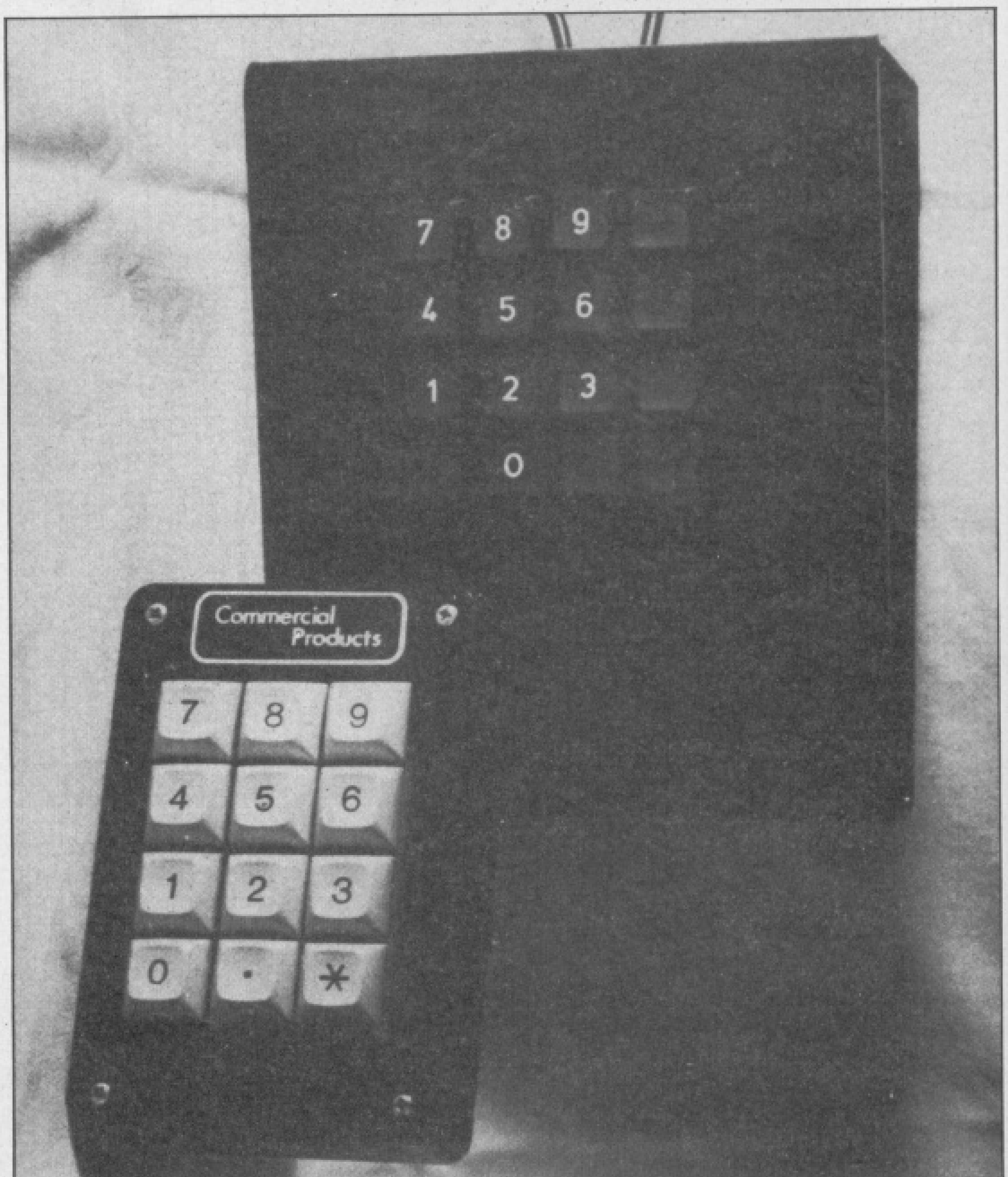
Commercial Products

This is not a programmable pad but it does have other advantages. The keys provided are 1 to 9 * and .(full stop). A RETURN key would have been nice, but one can't have everything.

It is much smaller than the Voltmace product and looks practical rather than pretty. If it had only been about ½" less deep, it would have fitted into the storage slot of my SX-64. The keys are very nice and are sculptured. A ribbon connector trails from the top. This looks a little delicate; the pad would look better and stronger if multi-core cable was used.

This pad scores points over the Voltmace through being a hardwired connection into the machine. The original keyboard connector piggy-backs onto the plug provided. This requires opening the machine and identifying the relevant connector. Due to the very clear instructions, it is an easy and solderless job. It takes about two minutes to fit it. If you have an SX-64, connection is not so easy, but is possible.

I can recommend either of these keypads; it depends on your requirements – the Voltmace for programming, the Commercial Products for business.



Commercial Products keypad (in front) and (behind) Voltmace keypad

Joysticks

It seems that the initial flood of new joysticks has slowed down into a trickle and the only ones that appear now are from the well known names.

Kempston Formula 1

This is a version of the old Kempston Pro. From what I could see there was nothing new about it except that it had undergone a fairly dramatic colour change. What was once a nice, robust, unusual, long-lasting *black* workhorse is now a nice, robust, unusual, long-lasting *blue* workhorse. Half a dozen friends have seen it and they all responded with the same cry: "It's gross!", and I certainly agree with them.

But the joystick itself is good. The strong leaf switches give a definite 'click' and it survived the hammering I gave it. In my last review of the Kempston Pro I said that, although it was a good stick, I did not personally like it. But I've now grown used to it. No fear of my getting to like this one though. But it's colour makes it difficult to lose!



Kempston Formula 1 and Formula 2

Kempston Formula 2

This suffers the same problem as the Formula 1: it's blue. Apart from that, it's not too bad. It's quite strong and lasted well although I did begin to get concerned about the shaft. It started to feel a bit 'gooey' but has not given up the ghost yet.

It was difficult to examine the switches since they are pretty well encased but, judging by the quality of the rest of its innards, I should imagine they are pretty hefty. The fire buttons (one on the top of the stick and two on the base) are small but reliable. The semi-sculptured handle is more comfortable than it looks. This works well, it lasts well and the quality of the casing is excellent but there is nothing 'new' about it.

Vulcan Gunshot 1

This looks good – two-tone cream that matches the 64. It is nicely styled with an optional autofire switch. It is by far my favourite to use except ... it didn't last! After a few full sessions with Impossible Mission, I found my man kept falling to the left in kamikaze dives onto robots. Investigations resulted in the Gunshot being found guilty and its sentence was a strip down to reveal its workings.

In my article Gripping Stuff (Dec. 84 issue), I gave the Quickshot II a verbal battering. On spilling the guts of the Gunshot, I found the very same switches – four-pointed stars of very thin metal which last about as long as butter in the sun. On the review model, cracks had already appeared in the arm so, occasionally, the arm would touch the contact and my spy would make involuntary, and often fatal leaps to the left.

On the whole, it looks good and feels excellent – no blisters (although that is possibly because it didn't last long enough). But, if something was done about its reliability, I would like one.

There is also a rapid fire version – Gunshot II – which is available in black.

If you could mix the insides of the Pro with the outside of the Gunshot, I think you would have a good joystick. As they stand, I am not over impressed with any of them. If I was going to buy any of them I think I would buy the Pro and then buy a tin of black paint and spray it!

Vulcan Gunshot 1 and Gunshot 2



Numeric keypad – £29.95
Voltmace,
Park Drive,
Baldock,
Herts.
Tel: 0462 894410

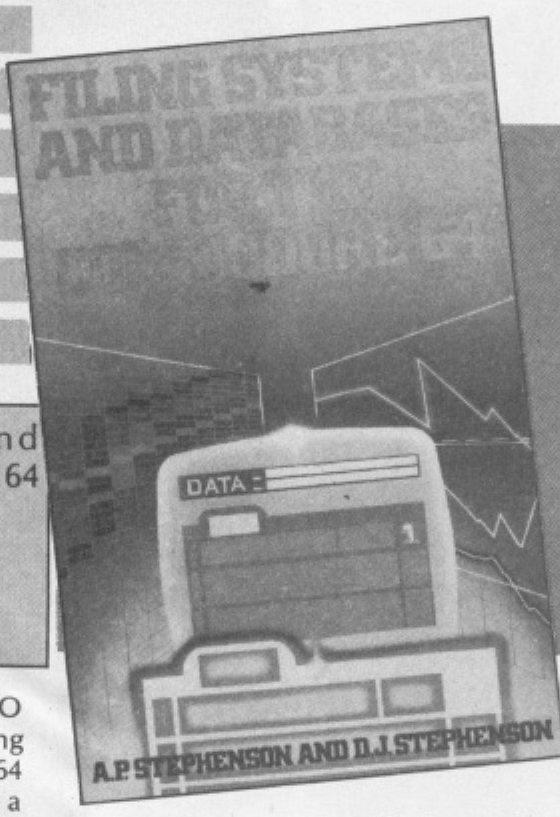
Numeric keypad – £29.95
Commercial Products,
20 Batemans Court,
Furnace Green,
Crawley,
Sussex,
RH10 6PS
Tel: 0293 30174

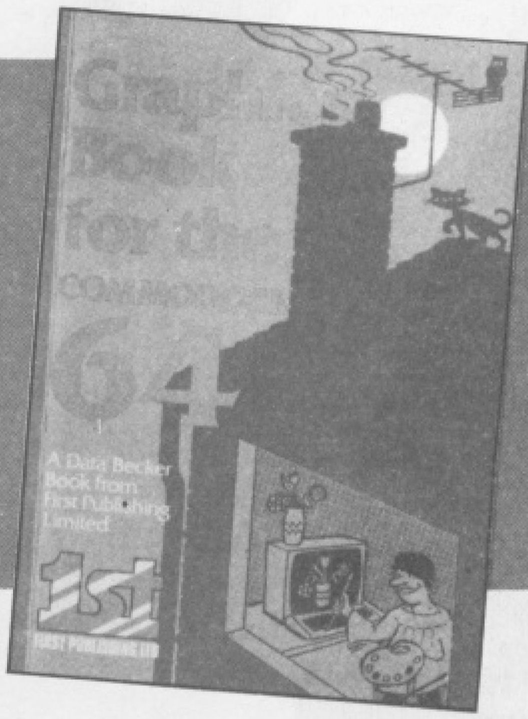
Formula 1 – £16.95
Formula 2 – £11.95
Kempston Micro Electronics Ltd.,
Singer Way,
Woburn Road Industrial Estate,
Kempston,
Beds,
MK42 7AF
Tel: 0234 856633

Gunshot 1 – £8.95
Gunshot 2 – £11.95
Vulcan Electronics Ltd,
200 Brent Street,
Hendon,
London NW4 1BH
Tel: 01-203 6366

REFERENCE

From graphics to machine code, there's a whole range of books to suit every Commodore user's taste. Garry Marshall and Evelyn Mills delve into some of the current titles.





Title: Filing Systems And Databases For The Commodore 64
Author: A.P. and D.J. Stephenson
Publisher: Collins
Price: £7.95

THIS BOOK DEALS WITH HOW TO write your own programs for storing and retrieving information using the 64 and its peripherals. It deals with this in a straightforward manner showing how the computer can be used for a valuable and much needed activity. At the same time, it provides a down-to-earth but basically orthodox treatment of its subject that gives database users all the background that they could need. In this way, it successfully bridges the gap between the needs of the pure user and those of the programming enthusiast, which seems to me to be the chasm into which rather too many books unerringly plunge.

The book starts with a look at conventional, buit barely organised, ways of storing information such as the cardboard box and labelled jam jars. From these familiar starting points, it draws out the features that a computer-based filing system must have, and then goes on to demonstrate the advantages that it has over a conventional system. That some demands will be made of the user, not least some careful systematic thought, is also spelt out.

This leads on to an examination of the relevant features of computer memory and permanent storage media. Cassettes and discs are both discussed, and the ways in which they store files of information are explained. The authors believe the cassette-based operations are quite viable for the enthusiast, even though they are inevitably slower than using a disc and I am inclined to agree. To wait a few minutes is not unbearable and, as the authors point out, the time need not be wasted. You can go off and do something else and, if the system is set up to give an audible alarm when it is ready to continue, you can come back to it then.

The good thing about the explanations of the storage media is that they are quite explicit about the amount of storage that is available, on a disc or a cassette, and that they relate this directly to the amount of information that can be stored, either as a number of names and addresses or as a number of records each carrying, say, the details of one stamp in a stamp collection. At this stage we know precisely how large a file can be stored on a disc or a cassette.

The importance of making programs 'user-friendly' is also discussed. This is not a subject on which to be dogmatic, and the Stephensons are not. The things that can make a program user-friendly to the beginner can be intensely annoying to the experienced user. Even so, it is probably a good idea to make the experienced user pause before doing something as drastic as destroying previously entered information. A pragmatic approach is recommended and is built into the programs in the book, but only to a limited extent, which illustrates the idea without distracting attention from the essential purpose of the programs.

Definition of the essential terms, such as files, records and fields then leads into a discussion of sequential-access and direct-access files, and the interaction between the storage medium and the type of file that should be employed with it.

The development of programs for storing and retrieving information begins with simple programs that effectively simulate file-handling systems by reading their data from a 'file' held as DATA statements within the program. From this familiar beginning, we naturally progress to programs for handling data in files on cassette and on disc and the necessary commands are introduced as they are needed. The programs themselves are full of comments and are sufficiently well structured to make them readily understandable. It will be possible to amend and extend them with very little fuss.

After this, various methods of sorting files into order are introduced and programs implementing the methods are presented. There are programs in machine code, as well as in BASIC, since sorting a large file can be a lengthy process, so that the increase in speed that machine code gives can be much appreciated. After this, methods of searching a file are explained and implemented. If you have ever wondered why computer books tend to be full of programs for sorting, this one shows how much quicker it is to find an item of information in a file that has been sorted into order than in one that has not.

The final chapters deal with files that are organised in various different ways, including the relative files that are unique to Commodore.

The book is neatly rounded out by a summary, a set of self-assessment questions at the end of each chapter, and a useful glossary. This is a very attractive, practical treatment of computer-based filing systems and databases. It will appeal

LIBRARY



to anyone who has an interest in them, and will stimulate the appetite of people looking for a worthwhile computer application to get their teeth into.

Title: Graphics Book For The Commodore 64
Author: Axel Plenge
Publisher: First Publishing Ltd.
Price:

STARTING FROM PRIMITIVE BEGINnings with bits, bytes, number systems and logic operations, this is a complete guide to graphics programming on the 64. It eventually progresses to bit-mapped graphics, designing your own character sets, sprites and even handling a light pen.

The book is aimed at the graphics programmer who will be writing in BASIC, although some programs are presented in assembly code. A complete and coherent treatment is given showing how all the 64's graphics features can be accesssed. This is brought together in a chapter called 'Fundamental graphics programming', which manages to strike some sort of balance between dealing with the general underlying principles of graphics programming and the way that they can be brought to bear on the 64.

A chapter on the applications of graphics deals with perspective and producing images to represent three-dimensional objects in a realistic way. It also shows how to deal with animation and graphics in ways that would be suitable for the fastest-moving games.

This is as good a coverage of graphics programming for the 64 as I have seen. I particularly like the way that the different aspects are related to each other, giving an overall unity to the book. As there are a great many programs in the book, I was pleased to read on page three that a diskette containing all of them is available and that the ordering information is on the back of the book. Alas, the back page is bare!

Title: Tricks and Tips for Your Commodore 64
Authors: Lathar Englisch, Klaus Gerits, Michael Angerhausen
Publishers: First Publishing Ltd.
Price: £8.95

'TRICKS AND TIPS' IS AN INTERESTING book. Whilst there is nothing particularly new in its contents for the more experienced programmer, it does give the reader an opportunity to program in machine code. If you don't have an assembler, each program is duplicated in BASIC using machine code numerical data. All the machine language programs are very well documented and fully functional.

The book deals with a variety of subjects including high resolution graphics, character set defining, screen division, scrolling, cursor control and function key programming.

BASIC is extended to copying into RAM while there is a useful line RESTORE routine which is lacking in the 64. The 'no more negative numbers with the Frequency Function' is an odd insertion in view of the fact that a positive answer can already be given by the 64 by a simple formula query. Other programs include auto-line renumbering and so forth. This brings us to the subject of programming in FORTH which is briefly discussed in four pages while a rather extensive study of the use of CP/M programming with the 64 is given. Useful if you have the utility.

For good measure we are given technical data for linking your Commodre 64 to a stereo output, but this is far too brief to be useful. Thereafter, 20% of the book is devoted to Data Management and Filing Systems with full program listings.

Although this book is a mixture of various types of information but, pleasurably, it gives you the opportunity to bring out that assembler and program in machine language very effectively. No assembler? Well the basic loaders and programs are there with no apparent bugs in either language. A reasonable if somewhat expensive book.

Title: Machine Language Book for the Commodre 64
Author: Lathar Englisch
Publishers: First Publishing Ltd
Price: £8.95

FOR THOSE WHO WISH TO LEARN machine code it should be clearly understood that this is a 'language' totally different from, and yet closely interlinked with, BASIC; it has therefore to be studied with considerable care and attention. The 'Machine Language Book for the Commodore 64' provides an excellent basis for doing this and the author is meticulous in his discussion of the theory and practice of the language.

Complete listings are given for a 6510 assembler, single step simulator and a disassembler; these listings are tedious to type in, but a disc copy is available for purchase (particulars of purchase, cost etc. are given in Appendix F which is not listed in the book).

A short 'Untoken' listing is also detailed and should give no problems in handling techniques. It is virtually essential to utilise this particular assembler with the book (unless you know enough about machine code to use another!) as most programs are structured around the LEA (author's assembler).

Machine language programming is devoted mainly to high-resolution graphics with some minor programs on extending basic and input/output routines for filing and printing. Should you want a good factual tutorial on machine language this book can be highly recommended.

BEHIND CLOSED DOORS

Anirog have been in the forefront of the Commodore games market for a couple of years, and were one of the first companies to experiment with C16 software. Alison Hjul paid them a visit.

AS A CHILD, I LIVED NEXT DOOR TO A house called Andora. My envy was twofold. Not only was our house merely distinguishable by its number (57) but Andora was such a wonderful, magical-sounding name, evoking thoughts of far-away places in the sun or fairytale princesses. Imagine my disappointment on discovering the total lack of magic or mysticism attached to this name. The Browns had Christian names – Andy and Dora. Being a moderately bright child, it didn't take me long to put two and two together!

Well, fifteen years on, I still possess a modicum of that infantile quick-wittedness. So, when I visited Anil Gupta of Anirog, and discovered that his fellow director was a Mr Roger Gamon, I was quick to solve the mystery behind the name Anirog.

I visited Anil Gupta at Anirog's factory in Dartford. Tucked away in a dusty corner of Dartford's Victoria Industrial Estate, it is quite indistinguishable from the other functional buildings stretching across the estate. But, once inside, there's no disputing where you are. Covering the walls, are box after box of inlay cards bearing the famous Anirog insignia and such household names (if your house happens to contain a Commodore computer) as Flight Path 737 or PC Fuzz. While staff mechanically stuff cards into cassette cases, and glance disinterestedly at me as I stumble into their boxed environment in search of Mr. Gupta, the tape-copying machine hums furiously in the background.

"You couldn't buy a computer anywhere else except the bedding department in Crawley"

Anil Gupta appears, a small man concealing a wealth of ingenuity and business sense. He and Roger Gamon first met as design engineers at Philips where they helped make Philips totally automatic whilst increasing production fourfold. Anil is in charge of sales and marketing while Roger oversees development at their Horley branch.

Although Anirog's birth dates back to February 1982, it was a while before the two men left Philips. They started as computer dealers, selling VIC 20s from, of all places, the bedding department at the Co-op in Crawley. This was certainly no soft option! The profits didn't come rolling in – but they certainly did a big trade in voyeurism. Says Anil Gupta: "Enormous crowds just came to look. You couldn't buy a computer anywhere else except the bedding department in Crawley. It was the only place where the computer salesmen knew what they were doing".



Anil Gupta with factory staff

In fact, being surrounded by beds wasn't their main problem. Nor was it that people were disinterested in micro-computers; the mere size of their audience contradicted this theory. Lack of suitable software was the crux of the matter.

They had opted for the VIC 20 as the first colour computer. This created a lot of attention since people had never seen a colour computer before. But most of the software was Commodore's own, rather poor quality, output.

Anirog only reaped the rewards of all their hard work when they stared to produce their own software. They weren't the first non-Commodore company to do so. Anil recalls the first Commodore show he attended: "I bought Llamasoft's first game and Romic's Shark Attack.

He continues: "There were soon quite a few people on the market with good VIC games but Bugbyte had total supremacy. We didn't do an exhibition until the Midland Fair in April 1983. We hadn't realised that there were so many people interested in computers".

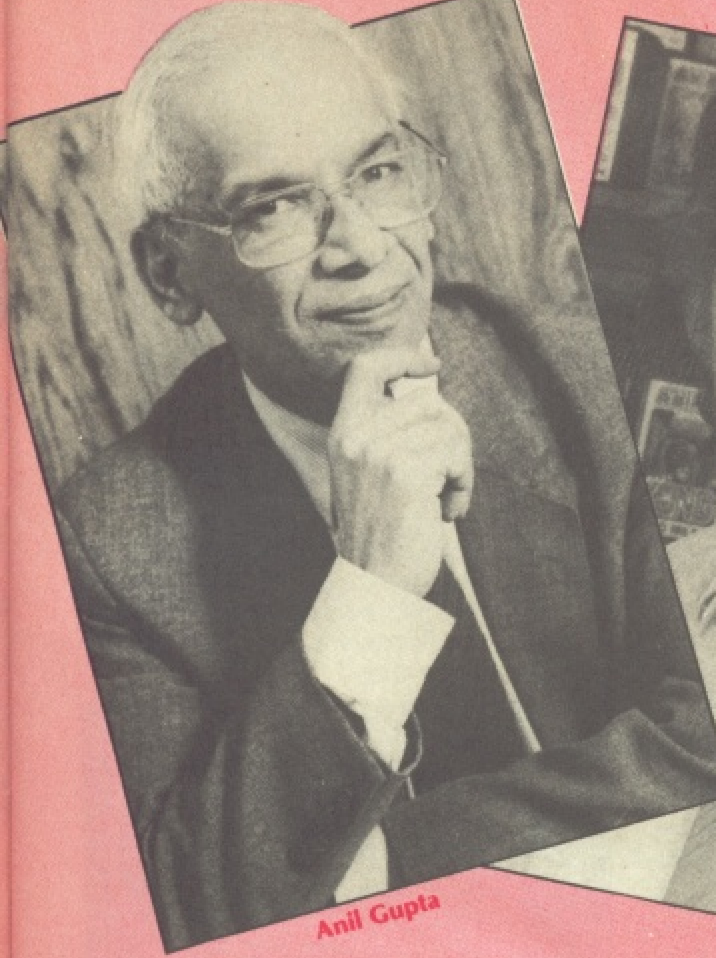
It was then that Roger and Anil realised that one of them must leave to concentrate fully on Anirog and exploit the potential which lay ahead. Anil left in May 1983 and set up Anirog with Pauline Lucas, in accounts and Lynn Taylor, in sales. Both women are still part of the Anirog team.

"Like every software house in the country at the time, we typed our own labels and did all our own packaging from home"

In June, he started a computer shop. Anirog have two computer shops (one in Dartford and one in Horley) at which they sell a lot of bits and pieces apart from Anirog software. The shops are not profitable but Anil uses them to gauge the market. For example, he is currently investigating the possibilities of entering the education market and uses the feedback from customers as a guide. More of this later.

They finally set up business premises in the first week of July. The Commodore show had proven such a success that, says Anil, "The money we took there paid for our furniture and everything else".

So, who were Anirog's early programmers? They consisted of Anil's and Roger's children and an assortment of onlookers from the bedding department, whom Anil and Roger trained as programmers. They now have a team of 25 programmers; although they work in house they are all employed on a freelance basis. Referring to their first game, Cavern Fighter, a scramble type game on the VIC 20, Anil says: "The hardest part was trying to fit it into 3½K of memory". As to initial production, "Like every software house in the country at the time, we typed our own labels and did all



Anil Gupta



Roger Gamon

our own packaging from home".

The company soon paid off very well. Anirog now have a string of successes behind them, probably the most famous being their Flight Path 737. But Anil clearly understands how much harder it is becoming to churn out one hit game after another.

He believes that steps must be taken to outwit, or at least keep up with, American imports, particularly those marketed by the company with the Midas touch, US Gold. "United we might survive", is his rousing call to action.

"No software house in this country is big enough to fight the Americans at their own game"

He has formed a very loose federation with 6 foreign companies (from Germany, France, Spain, Canada, Belgium and Holland) to market each other's programs. For example, Slap Shot, their current big seller, is a Canadian Game. Says Anil: "No software house in this country is big enough to fight the Americans at their own game. An American software house usually produces 3-4 programs a year, funded by £2-3,000 a time. I doubt whether any software house in this country can spend that on one program. US Gold is pushing out software houses. Their games are very good".

Anirog is diverging from the games market. Anil is very worried about the tough competition. "It is very difficult for us to compete on a shelf life of 3-4 weeks". He thinks that a software company can only compete in the games market with an infinite amount of games but no British company has such resources. Anirog are now publishing other companies' games. Apart from their ties with 6 foreign companies as mentioned above, their sprite machine utility, for example, is from Norway and is the first piece of Norwegian software to be published over here.

Anirog were one of the first companies to enter the C16 market. But, Anil Gupta isn't very optimistic about the C16. "I can't see it lasting very long, unless the low price brings it up again". He blames Commodore. Anil, in common with a lot of software companies, approached Commodore when the C16 first appeared. But, Commodore would not loan out the C16. They insisted that all programs must be released through them and that they should receive a percentage of the royalties. The result? "There was no software available, thanks to Commodore's marketing".

Once C16s were generally available, Anirog were one of the first companies to disassemble theirs in order to write and market their own software. They were, also, the only company to turbo their C16 programs. Their games have sold well. The news from our review team is that Anirog is one of the few companies to produce high quality software for the C16 – for example, Star Commander, Minipedes and the inevitable Flight Path 737 (see our C16 software special). Anil is certainly disillusioned by the general quality of C16 software. Referring to his other role, he says "When you are a shopkeeper, it breaks your heart when children return software and say it's rubbish".

Anil says they will produce 3 or 4 more games this year for this machine. What else have they got up their sleeves, then?

Two new utilities were demonstrated at the LET Show – Voice Master and Super Sketch. Voice Master is a digital recorder which certainly offers a lot of potential for the non-games market. Says Anil Gupta: "The Saudi Arabians are fascinated – it can help them learn to speak English".

And there is certainly keen interest from the educational sector. Because of its voice recognition facilities, for example, handicapped people may use it to play and give commands in adventure games.

Super Sketch is a low-cost tool for creating video graphics. Graphics can be created by 'free hand' or 'tracing' from drawings clipped to the pad. (We review both these utilities in a separate article).

Anil is also entering the educational software market. His wife is a teacher and has helped convince him that there is a greater need for good, realistically-priced software.

Anirog's introductory piece of educational software is Rhymeland which he says "will cater for children from 8-13 years. It is the same program at different levels of English and maths. It provides value for money, is educational and entertaining. Kids will play it because they want to play it". This is the sort of positive approach needed to edge the sharks out of the educational market. Anil says he might sell this product as a loss leader, so long as it serves its purpose. The 2 cassettes and the booklet will sell for £9.95.

I broached the subject of piracy. Anil seems to have given up trying to defeat the software pirates. He has joined various groups such as FAST but has now stopped answering any enquiries about pirated versions of his games. Stacked up beside his chair was a box-load of returned, pirated Anirog games.

Anirog have never pursued a direct publicity campaign. Anil seems anxious to maintain an image of an ordinary, medium-sized company. He believes that Anirog should be judged by its products: if people like them, they'll buy them. They have no PR company and have done little PR work themselves, although Anil's assistant, Clare, will now be taking on this job.

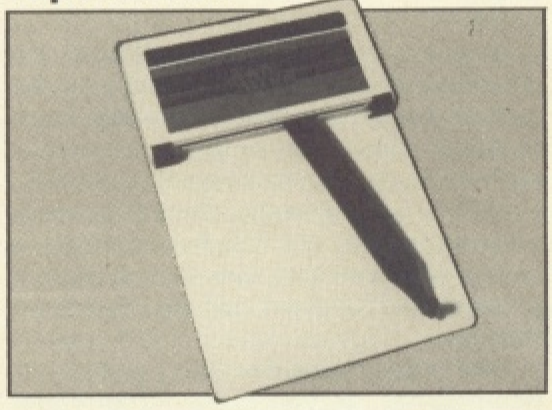
"There is not one game which we produce which I can actually play".

Anirog have, for a long time, been in the forefront of the Commodore games market. But, moving to fresher fields might be the right decision for the man who confesses, "There is not one game which we produce which I can actually play".

Anirog are out to prove that they're not just a games house. Allen Webb got a touch of the Leonardo's while Phil South found his voice (...we're still waiting for him to lose it!)

ANIROG EXTRAS

Super Sketch



Super Sketch consists of a drawing tablet and some software. Rather than operate on the pressure sensing principle, the tablet uses a stylus on the end of a moveable arm. By means of some potentiometers, the software is able to establish the position of the stylus on the tablet. This position is then mirrored on the screen by a small cursor. So, by moving the stylus around a shape, the shape can be transferred to the screen. Connecting the tablet is easy since it just plugs into joystick port 1.

Whilst the original American software was on cartridge, it will be on disc and cassette in the UK (at least the Anirog version). On loading, a title page is displayed and nudging a button you're in business. The tablet has five buttons at the top. The central button controls a clamp which is used to hold paper in place if you want to trace a shape. The two outmost buttons, labelled LIFT, are used to lift the pen from the paper so you can move about without drawing lines. LIFT also enables you to leave the menus. You can return to the main menu by pressing the MENU button. The button marked SELECT is used to pick menu options.

This system operates in normal multicolour mode offering 160 by 200 resolution with up to four colours per character block. You can, within the colour constraints, use up to 16 colours in your picture. The software is completely menu driven with four menus available.

The main menu provides the main system options such as colour change, fill, draw, erase, clear, undo and page swap (two drawing pages are available). From this menu you have access to the other menus. Both fill patterns and brushshape are user definable. Whilst 16 pre-defined shapes are available, you can create your own. This means that you can design a four colour tartan design and then paint a shape with this design. These options offer a huge range of shadings and colour tones.

The normal drawing options of lines, rays, boxes, circles, elipses, copy and a range of mirroring options are available offering excellent flexibilities. There is a zoom window available which allows you to carry out intricate work. A window option allows you to work on any specified area of screen.

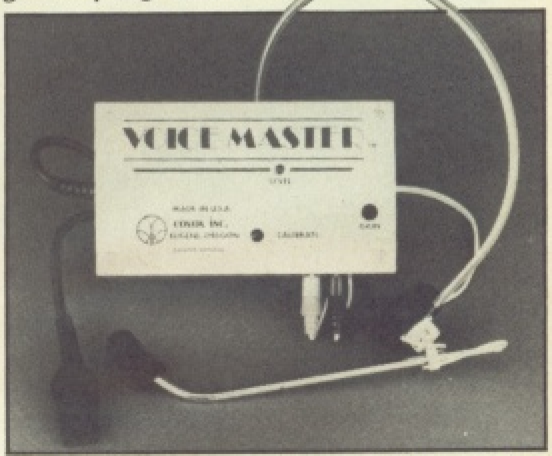
If there are any omissions, they are a printer dump and information on how to use the pictures in your own programs. Anirog advise me that they will provide both in the final version.

Overall this system operates faultlessly. The accuracy of the stylus is good and this is enhanced by the fact that there is almost a one to one size ratio between the tablet and the screen. The software was a joy to use being both simple and flexible. The simplicity of the software is exemplified by the fact that my ten year old daughter got to grips with it in minutes. The package comes with a series of line drawings which can be traced and coloured. At the price, this system is excellent value and great fun.

Voice Master

The instructions suggest that you might be able to "...have your computer talking back to you in your own voice, allow your computer to understand what you say, and write music and play an instrument just by humming..." Oh really?

What you get is the basic unit, a small brushed aluminium box, headset comprising a head mike and walkman style earphone combo, and the disc with all the programs on it. The box contains a sort of low quality sound sampling circuit, digitally recording the sounds you speak into the mike, and replaying the speech over the loudspeaker of your TV. An ideal popular example of the results you can get with this sort of system is the "Ghostbusters!" and "He slimed me!" from Ghostbusters by Activision. Once you have digitised your words, the results can be saved and played back on any 64, without the hardware. Good news for games programmers!



The voice recognition part of the package samples a word over and over, so that the word can be remembered, recognised and acted upon, even if you get a cold. You have to speak clearly though, it's no use saying "Fffffffire" if you want your laserbase to rapid fire!

Finally, the voice harp option gives you the ability to hum or whistle a tune into the mike, and have the computer print it out on a musical stave. Whether this last feature works or not, I don't have the slightest idea, as the review copy of the disc I was sent didn't have the program on it. Shame, because this was one of the most exciting features of the advertising!

All in all, this is a very tidy and up-to-date piece of kit. The sampling of voice cannot be any better quality, without additional hardware to govern hi-quality output. As a piece of program development hardware, computer/human interface, up-to-date games design hardware, it is an essential buy for 1985. No '64 should be without one.

Super Sketch — £49.95 (cassette) /£51.95 (disc)
Voice Master — £59.95
Anirog Software Ltd.,
29 West Hill,
Dartford,
Kent,
DAI 2EL.

SOFTWARE SPOTLIGHT

Our spotlight falls on another selection of new games and utilities.

Poker
★ ★ ★
Duckworth
£7.95
CBM 64

SITTING DOWN AT THE POKER TABLE with such a bunch of erstwhile villains and heroes of the likes of Matt Dillon, Black Jake and Billy the Kid is bound to be an education. Even more so if your education is as sadly lacking in the essentials of card school as mine is. Suffice it to say that I now have a pretty clear idea as to precisely what you're supposed to do with the five cards you are dealt. Would you believe it, I even won a hand out bluffing some of the biggest bluffers in the world? You start off the game with a thousand quid in your pocket. With a bit of luck you could turn a profit as the computer plays every hand except your own . . . unless, of course, you want a bit of assistance which it will give without, I may say, cheating. Moll is on hand to give you advice whenever you want it. Most of the time she will probably advise to throw it all in. Perhaps that's because the air is thick with cursing and there are more than a few fingers twitching on the trigger of a gun. As a spectacle this is a pretty unspectacular piece of software although it does teach the beginner the practicalities of the game.

K.M.

Rail Boss
★ ★
Commodore
£11.99
CBM 64 + 1541 Disk unit

IN THIS BUSINESS DISC BASED GAME you are boss of a small-time railroad in the Wild West. If you build a line through Indian and bandit country from Home City to the main line at Junction City you hit the big-time and win the game.

It loaded without trouble and the 10 page manual is easy to follow. The authors aimed both for a challenging game with pleasing graphics and a realistic but not too detailed simulation. Did they succeed?

Each turn represents a day. You may sell shares, buy a loco, hire or fire staff, build track and so on. You get reports on how you're doing and what is happening in the locality. Unfortunately, the pace is slow because you work through tediously repeated menu and information screens.

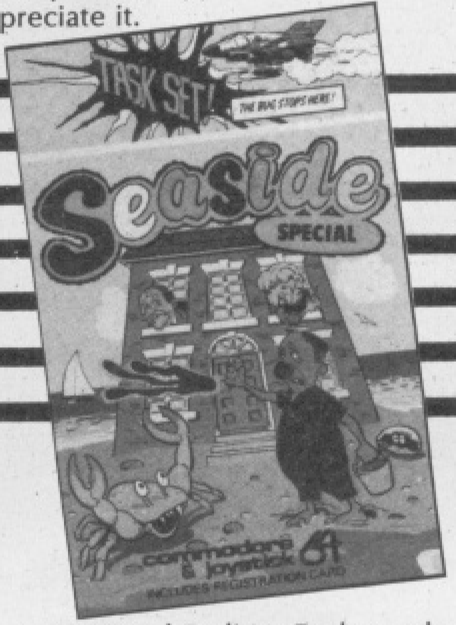
I completed a game in two sessions (there is a 'save' feature). The only challenge was to plod on; I don't fancy having another go. Once you get some track working there is little risk of bankruptcy but you can't make a fortune either because the robbers and greedy shareholders are programmed to limit your cash below $2100. The program only allows one work team at a time so you can't even plough profits into faster construction.

The graphics are fair but the presentation generally lacks polish. There is no sound until you win when you are treated to a little tune. The idea behind the game is good but you don't control enough decisions for this program to be very interesting as a simulation or challenging as a game. I'm afraid this railroad doesn't deliver the goods.

N.E.F.

Seaside Special
★ ★ ★ ★
Taskset
£6.90 (cassette)
CBM 64 + joystick

I RECKON GREENPEACE SUPPORTERS are going to love this new game from Taskset. But, even if you aren't a Greenpeace supporter, you can still appreciate it.



You control Radium Rodney who is a diminutive beachcomber. What he seems to want in life is to kill off a few of the insane 'Polytikians' by throwing radioactive seaweed at them. Getting the seaweed is the hard part.

Rodney must rush about the beach collecting clumps of the said weed while avoiding the strange variety of mutants which inhabit the place. These creatures range from guards to jellyfish. Guards march up and down the beach and will shoot anyone who gets in the way. Jellyfish will sting you to death. Crabs just nip your toe and make you jump about the place, usually into a guard or jellyfish. Seagulls have also mutated into giant birds which try to carry you away and clams even try to eat you.

Once you have collected ten clumps of seaweed, or more, you can exit the beach and head for ten Downing Street where the evil 'Polytikians' live. They will appear at windows and you must hit them at least five times to kill them. Those 'Polytikians' don't half look like the people who are running our country you know.

The graphics are great and often very funny. The sound effects are varied and the sound of the sea is very realistic. The game also includes the tune 'I do like to be beside the seaside'. I reckon it should have been called 'I don't like to be beside the seaside' for this game!

Overall this is an addictive, good humoured and sometimes frustrating game. Fans of Taskset games will love it – I did.

P.R.R.

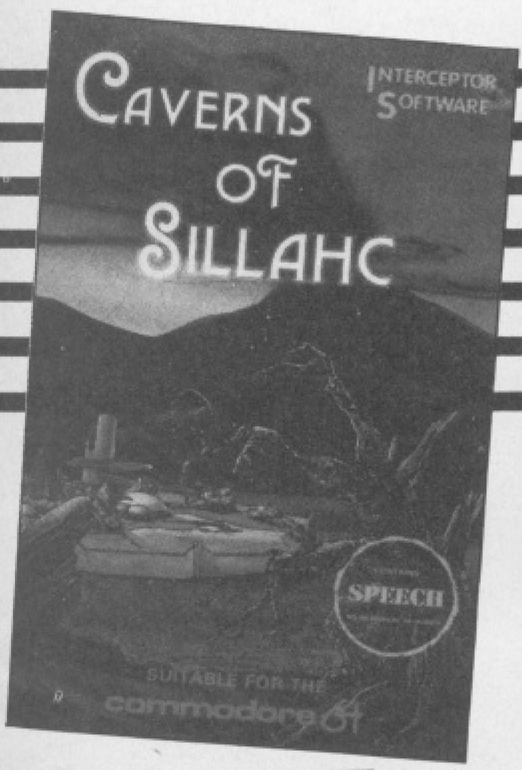
Caverns of Sillahc

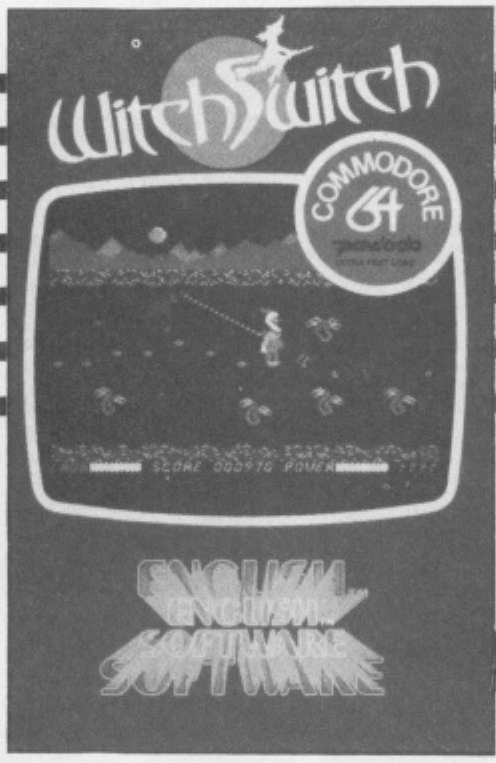
★ ★ ★ ★
Interceptor Software
£7.00
CBM 64

THIS IS A NEAT MIXTURE OF ARCADIAN zapping and cavern exploration, and it's pretty damn difficult into the bargain.

The torms have built huge underground civilisation which is maintained by a central power plant and the agricultural androids they have stolen from you. You have converted an agricultural robot sprayer into a mean craft and it is up to you to retrieve the stolen droids. But, naturally, there are obstacles in the way such as moving planets, anti-gravity mines, laser bases, alien cities, anti-matter blocks and floating electron charges. Locating the entrance and blasting your way through is just the easy bit. Once you're in, all the problems start. Only skilful control will help you here, and a keen mind for strategy, otherwise your spare ships will go down like nine pins. Not even the voice synthesiser wishing you luck in your mission can help you underground. Now I guess it is time to refuel and try for a fresh assault.

K.M.







Lunar Outpost

★ ★
Epyx
£8.95 (cassette); £11.95 (disc)
CBM 64

I'M STILL NOT QUITE SURE whether or not I understand this one. Anyway, here goes.

You are the Lunar Assault Vehicle commander charged with defending a lonely Earth outpost against the deadly Zytrons. You need to protect vital buildings containing fuel supplies, ammunition, repair and command centres. You must assess how many days you can survive before help arrives from Earth and each lunar day there are four waves of Zytrons. If you defeat one wave without losing a building, you automatically move on to the next level. The game takes place on two screens: the lunar map which covers about a quarter of the total area under your command, and the combat zone allowing you to fight the Zytrons in close up. You can skip from one map to the other when you decide to engage in battle. To survive you have some help. Power strips allow you to move without using your internal batteries, power stations to recharge, repair stations to rebuild, munitions buildings to re-arm and pulsars to jam the Zytron navigational computers.

In play, the whole thing seems even more confusing. Nothing is immediately recognisable and it certainly doesn't invite you to take it seriously enough to find what's what.

K.M.

Witchswitch

★ ★
English Software Company
£8.95
CBM 64 + Joystick

SAVE THE VILLAGE FROM being engulfed by the local volcano. Carry the magic powder to the lair of the evil witch and try to make her good. Help her find the wizard who lives in the castle and stem the flow of lava before it's too late!

Help the albino monkey lassoo the leprechaun, as he crosses the swamp by way of jumping from toadstool to toadstool. Fight off the attacking bird, whilst avoiding the innocent looking plants. Success in this brings you to a hump-back bridge over a stream. Before you can cross, you must kill a number of ravens whilst avoiding the cat on a broomstick at the same time. The magic power is then passed on to an owl.

The owl now has to fly over a poisonous lake, with snakes, green and brown tortoises, and strange clouds that zoom about flashing everywhere. Zap the snakes with your powder pouch to gain energy and points, but don't get bitten or struck by lightning!

You then move to the forest with wasps, snails, beetles, spiders and sticky webs, all out to get you. Dispose of them with your powerful HOOT, before arriving at the witch's house.

She is busy brewing an evil potion in a bubbling cauldron. If you can drop the magic powder in that cauldron, she will turn into a good witch. But watch out for her evil cat – it's partial to a nice meal of owl!

Then it's off to the jolly old castle on the witch's broomstick to pick up the wizard. Fly over the erupting volcano and drop some more powder into it to stop the lava flow. The flow can be monitored at any time by pressing the space bar. Pressing 'P' pauses the game, so you can recover your breath once more, before tackling the next stage. This adventure has six tasks, with ten difficulty levels. You commence with five lives. It includes on-screen scoring, with good graphics, and a soundtrack of several well-known light classical pieces of music, plus snatches of other tunes. The hill-billy banjo piece at the start is especially foot-tapping!

It's a good game for the kids.

M.F.N.

Break Fever
★ ★
Interceptor Software
£7.00 (cassette)
CBM 64 + Joystick

IF YOU HAVE EVER WANTED TO TRY break dancing without breaking your neck then this could be the game for you. Interceptor claim it is the break dance game for the '64. This may be so but I am not keen on break dancing at the best of times.

This cassette has a fast load system similar to the excellent NOVA load which gets things underway fairly quickly. Once loaded the title screen appears and the great sound track begins (the game's best point). A scrolling message thanks people who have helped with the game and also takes a stab at us poor reviewers! Pressing fire begins the game.

First of all you can select your break team's colours, a nice touch but I always used the standard default colours. Once this is done you can try your hand at the first dance. A graphical stage appears with a large backdrop covered in, what seemed to me, meaningless graffiti. Your break dancer appears in the centre of the stage.

There are seven different dance movements, some of which are more complex than others. They are; Turtle, Donkey kick, Space Shuttle (which was mentioned in the title screen message as a 'wind up to snotty reviewers' although I have no idea why), Headspin, Flip, Backslam and Backspin.

The game has no scoring system but ratings are given. They range from; 'You is bad news man' which is the lowest, right up to the top which is 'Awesome'. The graphics are quite good and the sound track is wonderful. However, I found the game pretty dull and not very playable at all. Interceptor have released some excellent titles in the past but this is not one of them.

P.R.R

SOFTWARE SPOTLIGHT



Rocket Roger
★ ★ ★ ★ ★
Alligata
£7.95
CBM 64 + joystick

IF 1984 WAS NOTABLE FOR NOTHING else it was definitely the year of the Platform and Ladder game. A variation on the original Kong theme seemed to emerge every few days and I for one nourished a fervent hope that the new year would instill some originality in software writers. Alligata didn't seem to share my hopes and have released yet another of the damn things.

Having got that off my chest, I have to say that Rocket Roger is by far the best game of its type that I have yet seen. In size alone it beats most others. The playing area is one continuous scrolling screen, so that the player is able to view the entire game without first having to clear any screen.

The actual game play takes place in a window which occupies the upper half of the screen, the remainder being used to display your score, lives and level. This adds to the difficulty factor as, when you jump, you lose sight of the ground as the screen scrolls with you thus making it impossible to be sure of where or on what you will land.

The game starts above ground but, as you zoom over high mountains with the aid of your jet pack, you soon spy a deep hole, beneath which lies a vast cavern full of the usual paraphernalia of electronic barriers, inaccessible platforms, elevators and monsters of the most unlikely kind. Fortunately, very little of the scenery, other than the monsters, is fatal to our reckless friend so that exploration is not as hazardous as is usually the case.

The motive behind all this activity is the need to find and retrieve 99 fuel crystals to enable you to re-fuel your stranded space ship and escape the planet.

These games leave me cold but if you like them – as many of you must – then check this one out. It is, as I say, the best I've seen.

D.J.T.

Headache
★ ★ ★
Firebird
£2.50 (cassette)
CBM 64

THIS IS A NEW GAME FROM the low-priced range of programs by Telecom's software house.

Your task is to help Ned deliver impulses to the brain inside a graphical head. Out to stop Ned are various Throbs. Don't worry though because you are equipped with an atomiser to zap them with. Also out to annoy you is Head Banger. If he gets to the brain, a headache occurs and you lose a life. I feel sorry for the person with all this going on in his head.

The screen comprises an outline of a head with a series of ladders and platforms inside. The ladders caused a few problems to climb as Ned is twice as wide as they are. The graphics on the whole are well defined and nicely animated. The sound effects are good and noisy. The music, however, leaves a bit to be desired. There is a two player option and you can begin play on any of eight levels. Each level has a new layout of ladders and different throbs to avoid and zap.

Overall this is a well presented game and is well worth the cheap asking price.

P.R.R.



SUPER BASIC for the Commodore 64
★ ★ ★ ★ ★
Century Software
£9.95
CBM 64

TO DATE I'VE SEEN SIX EXtended BASICs for the 64. This package is the cheapest of the bunch and, as such, proves an interesting exception to the rule that "You get what you pay for".

The code resides in the spare 4K between the ROMs and, by using the RAM behind the ROMs for the graphics screens, steals very little of the area for BASIC. I applaud this approach as being sensible and extremely desirable. In common with the other packages available, the extra commands cover the areas of graphics, sprites, sound and utilities. A swift scan of the available commands (36 of them) shows that they aren't particularly exceptional but do fill many gaps. Structured programming is completely unsupported so if you want procedures, IF...THEN...ELSE or REPEAT UNTIL, look elsewhere.

The utilities section covers most areas. For program editing there are AUTO, RENUM, PACK and DELETE. All work as expected. PACK removes spaces and REMs giving you more free space. POKE AND PEEK are available to permit the easy tweaking of vectors etc. POP is provided to let you loose a RETURN from the stack, but I consider it a programming failure if it must be used.

The graphics commands are versatile but a little rudimentary. Bit resolution plotting in both high resolution and multi-colour modes are supported with full control of plot colours. The actual drawing commands are thin on the ground with only points, lines and boxes. Neither FILL or CIRCLE are available.

Almost all conceivable commands are given for sprites. You can turn them on or off, specify multi-colour or hi-res, expand them, move them, change the colour and specify priorities. The only missing area is the detection of collisions. The sound commands are pretty extensive covering most of the basic functions. It's a pity that cross modulation of voices is not supported.

On the whole this is an excellent package which is very good value for money. The omissions in some commands aren't surprising when you consider that the package only occupies 4K.

A.W.



Icarus
★ ★
Commodore
£5.99
CBM 64 + Joystick

REMEMBER ICARUS? HE WAS the ancient Greek who tried to fly too close to the sun with his wings of wax and feathers, with predictable results! Well, in this quaint game, you have to help poor Icky to find his father Daedulus who has (pardon the pun) flown the nest.

Using your joystick, help Icky to fly over the land and seascapes of ancient Greece, avoiding villas, hills, evil Roc birds (which try to force you earthwards), giant bees (whose stings are fatal), clouds with smiling faces (which sap your energy), and the burning sun (which tries to draw you upwards into its fiery embrace – and disaster!).

You start out with five lives and can choose from five levels of play. Your energy can be replenished by landing on top of certain buildings. The lower you fly, the more points you amass – but watch out for the black cat that follows you everywhere, it certainly isn't lucky!

The opening sequence has a nice piece of music – but why does it only last for fifty seconds? The sprites are rather mediocre and the sounds boring. The kids should enjoy this for an hour or two.

M.F.N.

SOFTWARE SPOTLIGHT



Pastfinder
★ ★ ★ ★ ★
Activision
£9.99
CBM 64 + joystick

THANK YOU ACTIVISION. YOU'VE REassured me that all those coins plonked in Invaders machines in the dim and distant past were really funding a training programme for something worthwhile like Pastfinder. Make no mistake though, this game is to Space Invaders what kerosene rockets are to warp drive. It's a sort of arcade adventure with the emphasis definitely on arcade.

The player controls a little creature called a Leeper, a little mutant with a liking for radioactive holidays. Leeper moves forward only on a vertical scrolling screen but does he move forward whirling from side to side, gliding up and down complete with his own shadow giving the player an excellent perspective on all the action. There are obstacles to jump, raiding aliens and stationary debris to be shot and radiation pods to be torn asunder to reduce your radioactivity which naturally enough eventually kills you. The object is to meander through this scenario picking up the artifacts and depositing them at bases whereby untold benefits will befall the Leeper, old-fashioned things like an extra life every 5000 points and not at some ludicrously impossible target. As more artifacts are found, more of the master map is revealed at the end of each sector, thereby disclosing yet more bases. Useful items of equipment also have to be uplifted and can be selected from the menu which appears after each sector. There are hundreds of things to shoot but if you ignore the tactical choices open, you won't last for long. The graphics are smooth and clear throughout and, while the sounds aren't stunning, they've got that pulsating quality that made the original Invaders great. Activision just don't seem to produce bad games and this masterpiece is one of the most addictive I've seen in ages. Mortgage your monitor for it.

K.M.

Pascal 64
★ ★ ★ ★ ★
First Publishing Ltd
£34.99
CBM 64 (Disk drive required)

MANY 64 OWNERS BEMOAN THE LACK of structure of Commodore BASIC and buy add-ons such as Simon's BASIC to improve matters. PASCAL is a highly structured language which will appeal to those who want to write concise and intelligible programs. Like the UCSD system, this is a compiler which acts on a source code stored on disk. The source code is written using the 64's own editor and therefore has line numbers (a feature not seen in normal PASCAL). The compiled code is then transferred to disc and can be LOADed by use of a loader program.

The system includes the usual PASCAL commands but also contains a number of extensions such as POKE, PEEK and graphic commands. A SYS command is available as a link to machine code and two programs can be operated simultaneously using interrupts. The seventy page manual is reasonable albeit rather obscure in places. Novices will require one of the standard text books to learn the language.

Since PASCAL 64 is compiled, it operates at a decent speed, although I couldn't confirm the claimed 10 to 30 fold improvement over BASIC. Overall an excellent package which, at a reasonable price, gives a good introduction to an exciting language.

A.W.

Jack Attack

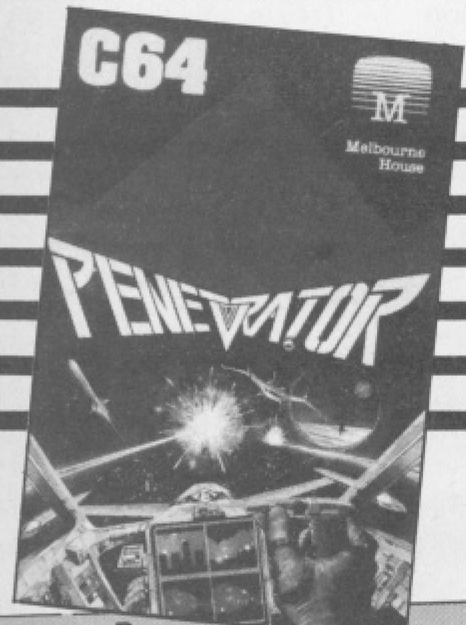
★ ★ ★
Commodore
£14.99
CBM 64

JACK'S A STAMPIN' HIS FEET and a rarin' to go. So watch out you rotating heads, stick around and be squished at your peril because this is not quite the bore it at first looks. Hint – read the instructions because there's more to Jack than meets the eye.

On each level of play out of a total of 64, there's a different arrangement of blocks on the screen which Jack can manoeuvre around in true push-me pull-you fashion. Play the building game right and you can squish the rotating heads which drop from the sky and bounce around menacingly waiting to pounce on Jack. Of course there are many other ways to do a bit of squishing such as by Jack dropping on top of a head from a well-timed jump or sliding off the top of a block. But be careful, Jack can only jump three blocks high and some screens have water and Jack can't swim. Other screens have strategically placed platforms for which there are bonus scores. Further bonuses are awarded for doing all the squishing you need to before the sand of time runs out.

Overall, not a bad interpretation and combination of various tried and tested themes.

K.M.







Congo Bongo

★ ★ ★
US Gold
£9.95 (cassette) £12.95 (disc)
CBM 64

THE TROUBLE WITH US GOLD IS THAT IT has set such high standards of gamesmanship in the past that anything less than the best can be a real disappointment. And there's no doubt that this is less than the best although it is nevertheless better than the average offering.

So what do we have here? A two player, two screen jungle adventure no less. First of all you have to climb a jungle mountain avoiding the falling coconuts, through monkey plateau populated by a family of piggy-backing baboons and on up to Congo's lair. Lives are lost for just being plain slow, getting clobbered by a runaway coconut and falling into the river. Reaching Congo's lair automatically takes you on to the second screen where you have to cross a fast flowing river by hitching a ride on the hippos, lily pads, passing fish and raging rhino on the other side. Shades of the ancient frogger here, me thinks. But forever onward. Success merely takes you back to the first screen although its not quite so easy this time around. More limpet-like monkeys no doubt!

K.M.

Pandora's Box

★
Commodore
£5.99
CBM 64

OH DEAR. IS THIS THE BEST THE MANUfacturer can produce for its own machine? Sadly this particular Pandora's Box is totally lacking in any delights. In game terms, it looks as old as the hills. The 1983 copyright is a dead give-away.

But still, on with the show. So does Pandora's Box contain? Naughty Pandora has pulled the lid off her box and is letting all the nasty bugs escape. The bugs change colour all the time and the only way she can stop them from escaping is by blowing them on to the side of the box, which is the same colour as they are but only when they have reached full size. Great eh? It gets even better. If Pandora gets bitten she automatically moves to the elixir table where you have to help her drink the right antedote.

There are eight levels to the game and you progress after the time period for each runs out. The game only ends when 25 bugs have escaped or Pandora has run out of antedotal elixir to drink. But then I almost forgot, there's always the power switch.

K.M.

Penetrator

★ ★ ★
Melbourne House
£7.95
CBM 64

THIS GAME CLOSELY REsembles 'Scramble' which was one of the first scrolling screen arcade shoot 'em ups in which you controlled a small space ship through caverns of varying complexity, whilst being shot at by missiles launched from beneath you. The object of the game was to destroy a missile dump, or something similar, on the last screen. You lost a life if hit by a missile or if you ran into anything. That, basically, was Scramble and that, basically, is Penetrator except that in the original, if my memory serves me right, you had to re-fuel your ship by the obscure practice of bombing fuel dumps. This strange tactic has been abandoned by Melbourne House: you never run out of fuel or weapons in Penetrator, only lives, and even then there is a simulator mode which gives unlimited lives (but no score, unfortunately).

And there you have it, but for one very nice touch: no matter how adept at the program you become you need never get bored with it as Melbourne House have included an edit feature with which you can redesign the entire game including the number and position of missile sites, radar and the complexity of the caverns, by simply following the on-screen prompts. This feature, I feel, is the saving grace of what is, after all, a copy of a successful game.

D.J.T.

Mr. Freeze
★ ★
Firebird Software
£2.50
CBM 64 + joystick (optional)

THIS PACKAGE FROM FIREbird is professionally produced. It loaded first time everytime, featured music (Bach) (on or off), had a pause and continue facility and an infinite number of combinations for keyboard control. Unfortunately, what it lacked was that spark of originality which sets the best apart from the rest. The game turned out to be yet another fairly ordinary platforms, ladders, killer objects combination.

Set in a freezer, your job as Mr. Freeze is to de-ice six compartments made up of six different screens of varying levels of difficulty, playable in any order. Hindering your good work is a horde of frozen renegades like fish, chicken legs, custard pies and so on as well as some cool customers in the shape of guardian robots. Quite an original plot but the alternatives boggle the mind – , Mr. Hot Rod to clean your oven, Percy Sill to clear the sump in the washer. Just think of all these titles in the offing. Yawn.

Apart from the background music, sounds were of the splurge variety but graphics, while hardly innovative, were well executed with a smooth changeover as Mr. Freeze walked from screen to screen. High scores were updated from game to game. While the romp had all the features of better games produced these days, after a few plays it left me cold (no pun intended!) but the price of the package has to be borne in mind. That said the competition in this price sector is becoming keen and with the similarly named completely different Chiller around, I know where my money would go. If you don't have a platforms/ladders type game, Mr. Freeze will fill a gap in any software library without straining funds. But with so many similar and better games around, paying a pound or two more might be a better option.

R.M.





Aqua Racer
★ ★ ★
Bubble Bus Software
£6.99
CBM 64 + joystick

IF YOU ENJOY THE EXCITEMENT OF power boating, this game is for you. The player controls his boat, complete with outboard and wake from the bouncing front end via the joystick around different courses of increasing difficulty. Forward is used for acceleration while pressing the fire button will change gear. The power boat is shown centre screen and the object is to complete each course within a given time without going outside the marker buoys or colliding with other boats which you inevitably have to overtake. The course and background scenery scrolls left and right with your direction of travel and all the graphics are well produced right down to a little chap who fires his cannon at the start of each race.

There are 20 ascending levels of difficulty and I found the qualifying round quite a test. Happily, there is a practice mode thus avoiding those busybodies in the other boats who always seem to get in the way. Any difficulty level can be selected for practice thus the horrors still to be faced can be previewed.

The menu screen also shows high scores, keeping a record of three. An option of up to four players is provided although this is limited to each player having one turn and seeing how far he can progress.

A hummable tune accompanies the selection menu but otherwise effects are of the white noise variety portraying engines, gear changes and collisions, Graphics are all well produced with good contrast in both the information and illustration side of things.

My only qualification would be the lack of visual variety on each succeeding level. All in all though, it's a goody.

R.M.

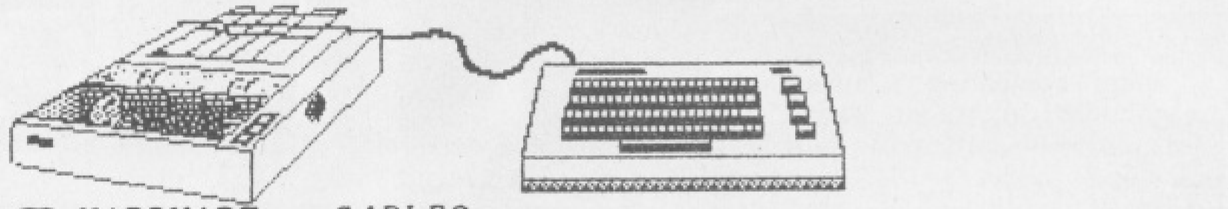


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The Advanced commodore 64 – CENTRONICS Interface / Printer Utility



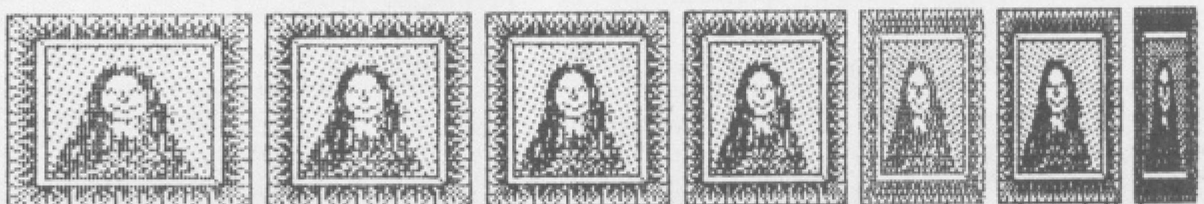
COMPATABLE HARDWARE – *CABLES*
The printer is connected to the 64 via the user port.. Pins A to N are used– (PA2 to strobe, and FLG to Acknowledge. A proper shielded multi-core cable is supplied (if needed) rather than ribbon. It works fine with 'EASY SCRIPT'.

SOFTWARE – *This program is fitted a disposable Auto-Relocater which enables it to Co-exist with most other utilities. You can, if desired, specify an address on loading. Another feature to put you in control!*

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VERSATILE *As stated at the top of the page, this whole page was printed out in just one run and not just 'stuck together' for the benefit of this advert*
Proof of what is possible when using 'CENTIPEDE'. So far I have mixed Hires with the printers' own font. There's more:–



Above.. I have taken a piece of Hires screen, and by using a simple FOR-NEXT loop, have dumped it here using each of the modes available on my printer. I even have a choice of 4 ROTATIONS! (The 4th can be for shading). The rotation can be used in both low and hi-res and, can be either a whole screen or just one character square. There are over 20 commands, and 255 secondary addresses, giving the user plenty of freedom to make his printer perform whatever tricks it was designed to. (and perhaps a few the makers hadn't thought about !).
The writer has even made some amendments to the operating system of the 64. Just to make life a little easier. You can print.. "CBM[illegible] Control codes" Or maybe... "CBM{clr}{rvs}{yel} Control codes"
Or if you're just not in the mood for opening and closing files, then you can use the '**' command which does it all for you!!
Generally, the use of ESC codes has been cut to the minimum so you may enjoy using your printer to the maximum. Of course, you can still use this utility as though the extra features didn't exist.. We don't want to change tradition ...Too much. Whichever way you want to use your printer. You'll find the way with 'CENTIPEDE'.

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MASTERING MACHINE CODE

A.P. and D.J. Stephenson sort out your data problems.

SORTING DATA INTO SOME kind of order involves an exceptional amount of processing time, most of which is spent comparing relative magnitudes. Although each individual comparison can be carried out in a few milliseconds using BASIC, the time taken for a complete numerical or alphabetical sort of, say, 1000 data items can take minutes, rather than seconds. Even one minute is a long time to wait just watching a blank screen. Of course there are efficient and not so efficient BASIC programs but even the best of them are often unacceptably slow. The answer, of course, is to use machine code subroutines which, in general, have the effect of changing minutes to seconds. Before attempting to describe them, we take a brief look at some of the hardware obstacles involved.

The execution speed of machine code solutions, however masterly in underlying design, must ultimately be limited by the hardware in general and the microprocessor, in particular. It is customary to measure the speed of a computer in terms of *mips,* which is an abbreviation for *millions of instructions per second.* The 6510A used in the Commodore 64 and the VIC is rather slow in terms of mips — around 0.5 mips. In contrast, some of the mainframe giants have a speed of about 100 mips and the few fifth generation models are predicted to approach 1000 mips.

So, we can see that our Commodore machines, in common with most other present day microcomputers, make exceptional demands on software techniques to overcome hardware deficiencies. Perhaps we should point out that one mip means one million *machine code instructions* (not BASIC statements) per second. When we consider that some BASIC statements require over 50 machine code instructions, it is clear that the situation is even worse. This means that BASIC must be the first casualty in the war against sluggishnes, and its place taken by machine code.

As we have seen, sorting data into numerical or alphabetical order is an inherently slow process and programs which frequently have to sort data, such as filing systems and databases, require machine code therapy to restore active life.

Integers and integer array storage

We have stressed the importance of machine code sorting but, in most cases, other parts of the program may be written in BASIC. We must, therefore, write the subroutines with this in mind. For example, machine code subroutines will be called from BASIC and then returned to it. The necessary parameters, such as the number of data items and where they are in the memory map, must be passed over to the subroutine from BASIC. This means that we must have detailed knowledge of the way numbers and strings are stored and arranged by the BASIC interpreter. Although, in most cases, data will be held in numerical or string arrays, we ought to start from the bottom and consider how integers are stored in the Commodore 64.

A simple integer can represent signed whole numbers between – 32768 and 32767. This requires 16 bits, 15 of them for magnitude and one (the msb), for sign. The two bytes necessary for each integer are stored as shown in Figure 9.1

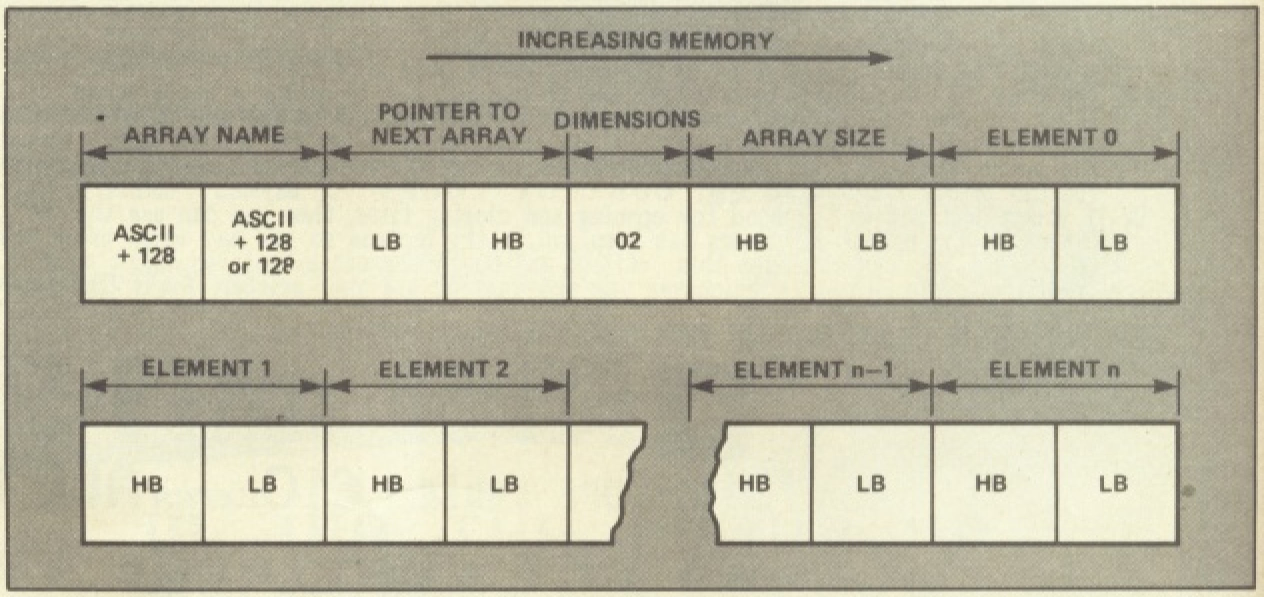


Figure 9.1 How the BASIC interpreter stores integers in an array

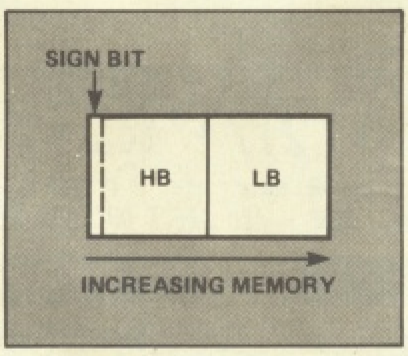


Figure 9.2 The components of the array header

Each integer of the array is stored in sequential addresses in the order, high byte first, low byte second. The starting address of each integer is therefore two ahead of the previous one.

The array header

In addition to the block of integer bytes, the BASIC interpreter requires some administrative 'paperwork' to be stored at the beginning of the block. After all, the array will have a name chosen by the programmer, for example A$(R). There may be more than one array, so the array name, in this case, A$, must be stored. The interpreter will also need to know what dimensions it has. For example, is it DIM A%(X) or is it DIM A%(X,Y). This information and some more bits and pieces are stored at the beginning of the block of integers termed *the array header*. The details are shown in Figure 9.2

The details of the array header are as follows:

Bytes 1 and 2
These are reserved for the two characters allowed for the array name. Byte 1 will contain the ASCII code + &80 of the first character and byte 2 the ASCII code of the second character +$80. But an array name can consist of only one character, in which case, byte 2 contains only +$80. The constant $80 in decimal is, of course, 128 in decimal and ensures that the msb is set to 1 for later identification purposes.

For example, if the array was named A%, byte 1 would have $C1=($41+$80) and byte 2 would have only the constant $80 because there is no second character.

Bytes 3 and 4
These represent an address pointer to the start of the next array (if another exists). Incrementing the start address of the present array by the contents of bytes 3 and 4 will produce the starting address of

Program Listing 1

```
10 ! BUBBLE SORT
20 ! ARRAY OF SIGNED INTEGERS
30 NUMBER       = $FB
40 CYCLE        = $FD
50 POINTER1     = $57
60 POINTER2     = $59
70 FLAG         = $FF
80 *=$C000
90                SEC
100               LDA NUMBER
110               SBC #1
120               STA NUMBER
130               BCS OUTERLOOP
140               DEC NUMBER+1
150 OUTERLOOP     CLC
160               LDA $2F
170               ADC #9
180               STA POINTER2
190               LDA $30
200               ADC #0
210               STA POINTER2+1
220               LDA #0
230               STA FLAG
240               STA CYCLE
250               STA CYCLE+1
260 INNERLOOP     LDA POINTER2+1
270               STA POINTER1+1
280               LDA POINTER2
290               STA POINTER1
300               CLC
310               ADC #2
320               STA POINTER2
330               BCC SKIP
340               INC POINTER2+1
350 SKIP          LDY #1
360               SEC
370               LDA (POINTER2),Y
380               SBC (POINTER1),Y
390               DEY
400               LDA (POINTER2),Y
410               SBC (POINTER1),Y
420               BVC NOOVERFLOW
430               EOR #$80
440 NOOVERFLOW    BPL NOSWOP
450               INY
460               STY FLAG
470 SWOPLOOP      LDA (POINTER1),Y
480               TAX
490               LDA (POINTER2),Y
500               STA (POINTER1),Y
510               TXA
520               STA (POINTER2),Y
530               DEY
540               BPL SWOPLOOP
550 NOSWOP        INC CYCLE
560               BNE SKIP2
570               INC CYCLE+1
580 SKIP2         LDA CYCLE
590               CMP NUMBER
600               BNE INNERLOOP
610               LDA CYCLE+1
620               CMP NUMBER+1
630               BNE INNERLOOP
640               LDA FLAG
650               BEQ FLAGCLEAR
660               LDA NUMBER
670               SEC
680               SBC #1
690               STA NUMBER
700               BCS SKIP3
710               DEC NUMBER+1
720               LDA NUMBER
730 SKIP3         BNE OUTERLOOP
740               LDA NUMBER+1
750               BNE OUTERLOOP
760 FLAGCLEAR     RTS

READY.
```

the next array — this can often be useful information.

Byte 5
This contains the number of dimensions in the array. For example, DIM A%(100,3) represents a two dimensional array, so byte 5 would contain binary 10 ($2). In fact, Figure 9.2 assumes this.

Bytes 6 and 7.
These two bytes hold the array size.

Bytes 8 onwards.
The array header finishes at byte 7 and the actual two-byte integers are stored sequentially following on from the end of the header. The first pair is element 0, the next pair element 1, and so on to the end of the block. In most cases, it is advisable to leave the space for element 0 empty and commence at element 1. If we do this, we note, from previous work, that incrementing the start address of the array by nine gives the address of the first array integer. On the other hand, if we utilise the element 0 position, we increment by only seven. Subsequent increments of two will lead us through the remaining integer pairs.

Supplying the parameters from BASIC

Now that we know how integers and their array headers are stored, we can work out what form of BASIC assignments must be written before calling on a machine code program for processing an array. For example:

Parameter passing
```
100   HB%=N%/256
110   LB%=N%-(HB%*256)
120   POKE 251,LB%
130   POKE 252,HB%
140   SYS 49152
```

N% = the number of integers in the array and a BASIC integer variable. This must be split into two component bytes, HB% for the high byte and LB% for the low byte. Note from line 100 that HB% is obtained by dividing by 256. Since N% is already in integer form there was no need to use the INT function. The low byte is obtained from the remainder, using the equation in line 110. The two bytes are then stored in addresses 251 and 252 using POKE. The machine code routine is assumed to start at $C000 which is 49152 decimal.

Program Listing 2

```
10 REM TESTING M/C INTEGER SORT ROUTINE
20 REM GENERATE RANDOM INTEGER ARRAY
30 PRINT CHR$(147)
40 INPUT"SORT HOW MANY INTEGERS";B%
50 REM FILL AND DISPLAY RANDOM ARRAY
60 DIM A%(B%)
70 FOR N=1 TO B%
80 A%(N)=INT(32000*RND(1))
90 A%(N)=A%(N)-16000
100 PRINT A%(N)
110 NEXT
120 PRINT
130 PRINT"SORTING"
140 PRINT
150 REM SET UP NUMBER PARAMETER
160 HB%=B%/256
170 LB%=B%-(HB%*256)
180 REM PASS NUMBER PARAMETER
190 POKE 251,LB%
200 POKE 252,HB%
210 REM CALL M/C SORT ROUTINE
220 TI$="000000"
230 SYS 49152
240 T%=TI/60+0.5
250 REM DISPLAY SORTED ARRAY
260 FOR N=1 TO B%
270 PRINT A%(N)
280 NEXT
290 PRINT:PRINT"SORTED"B%"INTEGERS IN"T%
"SECONDS
```

The bubble sort

Because of the importance of data sorting, many people have concentrated upon the problem and a bewildering number of different algorithms have evolved. A simple and well known algorithm, is the *bubble sort*. The details have been well documented but we will give a brief outline.

Two loops are involved. The inner loop compares, and if necessary, swaps adjacent items. The largest integer in the array always 'bubbles' down to the bottom — hence the name. It is no longer necessary to involve this integer, so the outer loop count is reduced by

Program Listing 3

```
C000 38 A5 FB E9 01 85 FB B0
C008 02 C6 FC 18 A5 2F 69 09
C010 85 59 A5 30 69 00 85 5A
C018 A9 00 85 FF 85 FD 85 FE
C020 A5 5A 85 58 A5 59 85 57
C028 18 69 02 85 59 90 02 E6
C030 5A A0 01 38 B1 59 F1 57
C038 88 B1 59 F1 57 50 02 49
C040 80 10 10 C8 84 FF B1 57
C048 AA B1 59 91 57 8A 91 59
C050 88 10 F3 E6 FD D0 02 E6
C058 FE A5 FD C5 FB D0 C1 A5
C060 FE C5 FC D0 BB A5 FF F0
C068 13 A5 FB 38 E9 01 85 FB
C070 B0 04 C6 FC A5 FB D0 93
C078 A5 FC D0 8F 60
```

Program 9.3 Hex dump version of Program 9.1

one and the inner loop is again entered. On subsequent loop cycles, the next largest integer bubbles down to the last but one position, and so on, until the entire array is sorted. Since a large number of comparisons are necessary, the execution speed, in BASIC, is very slow. In machine code however, the speed is increased to an acceptable level.

The use of a swap flag can speed up the execution of a bubble sort, particularly if the array is already partly ordered. (In practice, an array is seldom completely disordered.) The swap flag is reset to zero at the start of the outer loop and, if any swap is necessary, the flag is set to 1. If a complete cycle has occured and the flag remains clear, it indicates that a swap was unnecessary and the array must be completely sorted. As soon as this condition exists, no further loop cycles are required and the program can be terminated. Strictly speaking, the inclusion of the swap flag changes the pure bubble sort into a hybrid bubble/exchange sort.

A machine code bubble sort

Program 9.1 is a listing of a bubble sort using the swap flag.

It can be called from BASIC providing, of course, that the necessary parameters are sent.

Analysis of Program 9.1

The program uses many of the techniques described in earlier parts of the series. You may find it necessary to refer back to the December issue of 'Your Commodore' to remind yourself of indirect addressing.

Once this has been entered and assembled, it can be thoroughly tested out by means of Program 9.2 which is written in BASIC.

Using Program 9.2

To test out the machine code, the program first asks how many integers are to be sorted. The integers are obtained by coutesy of the random number generator and placed in an array named A%. The raw data, in its unsorted form, is then scrolled down the screen, in order to satisfy the user of the prevailing situation before the machine code gets to work. The parameters necessary for calling the machine code are the usual POKE statements described earlier. Before calling the subroutine with SYS 49150, the time clock TI$ is reset. On return from the machine code, the integers are then displayed in correct order followed by a display of the time taken to sort them. Note that the time taken to set up and display the random array often exceeds the sorting time, providing a good illustration of machine code speed. The clock, of course, measures only the sorting time. It is worth spending some time trying out the system with different numbers of integers. By doing this, you will discover how the number of integers is related to the sorting time. You will find that the relation is far from linear. In fact it is almost square law in form and is the reason why the bubble sort is not popular if very large arrays are involved. However, sorting 500 integers only takes a few seconds.

Explanation of Program 9.1

Lines 30 to 70	Assign symbolic names to certain zero page locations. (Zero page is essential for indirect addressing.) The number of integers in the array, together with certain other parameters, is picked up when running Program 9.2 which is used to test out the machine code. This is described later. It is sufficient in the meantime to refer back to the few lines given earlier. For example, POKE 251,LB% placed the low byte into the hex address $FB and the high byte into the next location $FC. Line 30 assigns the symbolic address NUMBER to LB%, the high byte will be in NUMBER +1.
Line 80	Ensures the code is assembled starting at the address &C000.
Lines 90 to 140	Decrement the two byte integer, NUMBER.
Lines 150 to 210	Store the address of the first element in the array in POINTER 2 (two bytes) by picking up the starting address from location $2F and $30 and adding the offset 9. The addition of 9 ensures the zeroth element of the array is not used.
Lines 210 to 250	Initialise the CYCLE counter and the swap FLAG.
Lines 260 to 290	Copy POINTER2 (two bytes) into POINTER1.
Lines 300 to 340	Add 2 to POINTER1 and stores the result in POINTER2 (two bytes). The reason for adding 2 is because the address of the next integer in the array is two bytes forward.
Line 350	Initialises the Y index register to 1 for indirect indexed addressing.
Lines 360 to 410	Subtract the first integer from the second, low byte then high byte, keeping the most significant byte of the result in the accumulator (this holds the all important sign bit). Indirect indexed addressing is used to pick up the integer bytes from memory. Remember that integers are stored with the high byte lowest in memory.
Line 420	Checks if the V flag is set. If clear, it skips line 430.
Line 430	Assumes that the V flag is set so reverses the sign bit.
Line 440	Tests the sign of the accumulator contents and bypasses the swap loop if positive (including zero). This ensures that if both integers are the same, no swapping occurs.
Line 450	Prepares the Y register for swapping.
Line 460	Stores the Y register contents in FLAG. In fact any non-zero number is sufficient to indicate a swap has taken place.
Lines 470 to 540	Handle the actual swapping of adjacent integers, starting with the high bytes. Time is saved if the higher bytes are tested first. The X register is used as a temporary storage cell because TAX is much faster than using a memory location. The stack could have used but PHA takes 3 cycles.
Lines 550 to 570	Increment the CYCLE counter by 1.
Lines 580 to 630	Compare the low byte of CYCLE and NUMBER. If the result is non zero, a branch is made to the label INNER-LOOP. If the result is zero, the program 'falls through' to compare the high byte in the same manner.
Lines 640 to 650	Checks if FLAG is clear and, if so, a branch down to FLAGCLEAR is made ready for exit.
Lines 660 to 710	Decrements NUMBER (two bytes to be taken into account).
Lines 700 to 730	Check if NUMBER has reached zero. The low byte is checked first, branching to OUTERLOOP if not zero. If the low byte is zero, the high byte is similarly checked.

128 PREVIEW



The Commodore C128 is the hottest Commodore news from the States at the moment and should be available in the UK from mid-summer. Barry Miles provides a sneak preview from his study of a prototype of the machine.

THE BURNING QUESTION MUST BE "Has Commodore got it right this time?", especially in the wake of the still-birth of the 500 and 700 machines, and the question-mark over the Plus/4, following it's recent price cut.

The C128 possesses an enlarged memory and can operate in a special emulation mode, thus making it compatible with existing Commodore 64 software. It can also run under CP/M which is a substantial advancement. This machine has an integral disc drive option and it should be possible to read CP/M discs which have been formatted on other makes of disc drives.

As far as looks go, the 128 is a very elegant machine. The main box which houses the CPU is pleasantly angular in shape and has ample space to take the integral disc drive. The keyboard is detached and on a cable which enables the user to place it at a substantial distance away from the main unit and monitor. The key-strokes are identical to the 64's, something which 64 users will find attractive.

The function keys are at the top right-hand corner of the keyboard which means that, using them shifted, requires two hands. There are four cursor movement keys on the top row. On the top left of the keyboard are the ESCAPE, TAB, ALTERNATE and CAPS LOCK keys. Adjacent to these is another group of four keys – HELP, LINE FEED, 40/80 DISPLAY and NO SCROLL.

The machine has been made more transportable by incorporating a recess underneath the main unit into which the keyboard will clip.

The sockets to the rear of the machine are the familiar 64 ones. The C128 uses standard 'D-type' connectors for joysticks, unlike the Plus/4 and C16. Also, the cassette connector connects to a normal type of Commodore cassette unit rather than the special one which is marketed for the C16 and Plus/4.

The integral disc drive in the machine I examined was a 5¼" floppy-disc version. Judging by the shape of the computer's box, twin floppies should be possible but there are no plans to include a hard disc version at the moment.

When using the disc drive in 64 mode, it operates at the cumbersome 1541 speed but it speeds up when in CP/M or C128 mode. One might have hoped that, when the machine is operating as a 64, the spare 64K of RAM would be used as RAM-disc to speed up operation of programs which require considerable disc access. Unfortunately, in pursuit of true 100% Commodore 64 compatibility, this facility has not been provided. Maybe it won't be long before people will devise methods of convincing the machine temporarily that it is operating as a C128 while disc access is operating as a C128 while disc access is taking place, only to switch back to 64 emulation mode as soon as disc access is finished!

In operation

On power-up you are automatically placed in the C128 mode. The power-on message says 122365 bytes free which is quite impressive to old Commodre hands! If you have an integral disc drive fitted, then the machine immediately tries to boot the first program on the disc.

In C128 mode, the default is a 40-column screen display. However, you can change to the 80-column display simply by pressing the 40/80 key after turning the computer on. Once you have entered the C64 or CP/M modes, you must press the RESET button or turn the machine off and on again to return to C128 mode. To enter C64 mode, you either insert a cartridge containing 64 type code or enter GO 64 and RETURN. The CP/M mode cannot be entered from the 64 mode but, from C128 mode, you type BOOT CP/M and press RETURN. Alternatively, if you have a CP/M utilities disc in the disc drive, on power-up, CP/M will automatically be booted.

In fact, one of the more exciting aspects of the C128 mode is that you can have 3 screens operating in 80 column mode, only one of which is visible at a time. Consequently, the computer can be working on one screen whilst showing another, and the user can switch between them rapidly. The connectors on the machine permit you to use two monitors simultaneously, one showing 40 columns and one 80 columns. It is therefore possible to have two different displays controlled by a single program.

BASIC

The new computer continues the improvement in Commodore BASIC

which was apparent in the Plus/4 and C16.

It uses BASIC 7.0, which contains about 50 more commands than the 64's BASIC 2.0. The enhancements include a variety of 'toolkit' type commands, disc handling commands which made BASIC 7.0 a true disc BASIC and substantial new graphic and sound commands.

Users will also be delighted to know that the C128 reinstates the sprites and enhances them to a higher level than that achieved within the 64.

A variety of structured programming commands like DO UNTIL, DO WHILE, LOOP UNTIL, LOOP WHILE, IF THEN ELSE have been included. Hopefully, the extremely structured programming language, COMAL, about to become available on the 64, will appear on the C128.

Function keys

The function keys have useful defaults attached to them. These are as follows:

F1..........	Enters one of the graphics modes when the user supplies the number of graphic's area.
F2..........	Performs a DLOAD so that it will load a program named by the user.
F3..........	Lists a directory on the screen without disturbing the program in memory.
F4..........	Clears the screen using the SCNCLR command.
F5..........	Prints DSAVE followed by inverted commas on the screen so that the user only needs to enter the program name to save the current program.
F6..........	Executes a RUN.
F7..........	Lists the program automatically.
F8..........	The HELP key which highlights errors in any BASIC program which has been stopped by that error.

You can easily redefine the function keys to suit your own purposes.

Other commands

These include DIR, TRAC to trace BASIC programs, a WINDOW command, DVERIFY with which you can check the program on the specified disc drive against the program in memory.

Since the 128K memory is held in 2 banks, there is a BANK command which enables you to switch the bank with which you are operating for PEEK, POKE and SYS commands. An EXIT command allows you to exit from a loop, if certain conditions are satisfied, without disturbing the stack.

Graphics

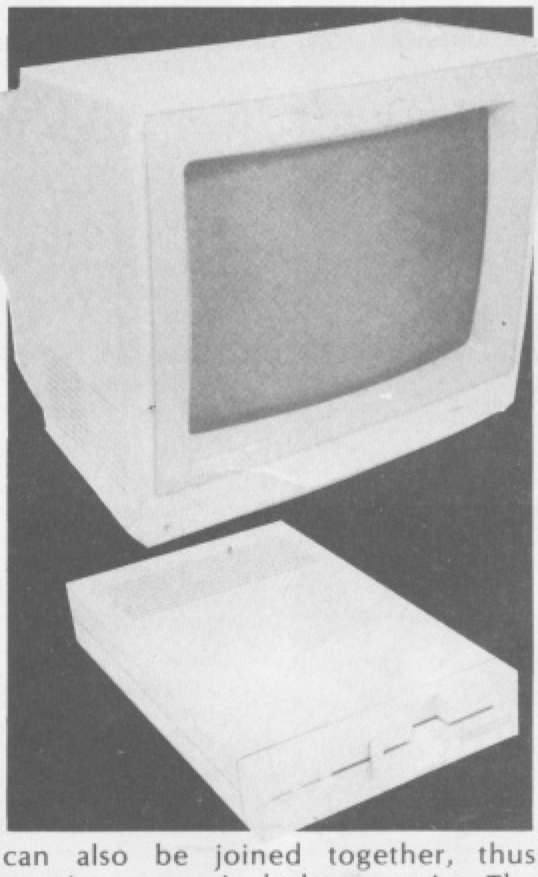
The C128 does have excellent graphics capabilities. It can display 16 colours in eight levels of luminance, each in five different graphic modes; it has 8 sprites. Split screens are available in high resolution and multi-colour mode. Colour commands include LOCATE, CIRCLE, DRAW, MOVE SHAPE and a whole string of others such as PAINT and BOX.

Scaling can be used in plotting on the screen, either in high resolution or multicolour mode. The scaling of bit maps in the multicolour and high resolution modes can be charged with a SCALE command. Coordinates can then be scaled up to as high as 1023 in X and Y directions rather than the normal scale of 0 to 159 and 0 to 199 in multicolour, 0 to 319 and 0 to 199 in high resolution.

Sprite commands have been simplified: SSHAPE, GSHAPE, MOVESHAPE, SPRITE, MOVESPR, SPRCOLOR and COLLISION are provided. Sprites can also be stored in a simplified fashion – as text strings.

Sprites can be created in a number of ways: as with the 64, using a Sprite Editor or using the aforementioned commands within a program.

You can draw a 24 by 21 pixels picture on the screen and then convert it into a sprite by using the SSHAPE and MOVESHAPE commands. Sprites can be expanded vertically and horizontally and



can also be joined together, thus creating a seemingly larger sprite. The sprites can then be moved either individually or together. As many as three, four or even more sprites may be moved together. Sprite collision has also been rectified with the COLINT command.

It is, also, now possible to move a sprite at a pre-determined speed along a chosen route. This has only previously been possible by using COMAL or some other Simon's BASIC extension. You can also specify by how many degrees the sprite is to move.

Sound commands

New sound commands, previously accessible only by POKEs on the 64, include SOUND, ENVELOPE, VOL, TEMPO, PLAY and FILTER. TEMPO changes the duration of notes when playing music, TUNE defines musical instruments envelopes and VOL defines the level of sound volume.

1571 Disc drive

The new 1571 disc drive for use with the C128 operates at 300 characters per second when used in 64 mode and can go up to 4,136 characters per second while it is operating in C128 or CP/M mode.

Monitor

A monitor which has been devised for use witth the C128, offers RGBI mode, 80 characters by 25 rows on a 5×7 matrix and, in composite mode, 40 characters by 25 rows on a 6×7 matrix. It should be noted that a television set or a 1701 or 1702 Commodore monitor can only function in 40 column mode with this computer.

Machine code programmers will be pleased to know that a machine code monitor of comparable quality to that in the Plus/4 has been included in the C128. Amusingly enough, the SAVE command still requires you to add one to the final address!

Conclusion

Whilst this is only a preview of the C128, I do think it is fair to say that Commodore seem to have got it right this time. The availability of a faster disc drive is not and thousands of Commodore 64 programs to run on the new machine guarantees that the new users will not be starved of software when the machine becomes available. Additionally, the new developments within the 128 mode are attractive enough to ensure that this machine has a lot to offer the user. The availability of a faster disc drive is not to be sneezed at, and amends one of the major criticisms of the 64. Of course, pricing will play a crucial role in the success of this machine, and Commodore are giving no hints as to what this might be. My best advice to readers is to watch this space.

This month, Your Commodore's 'problem page' provides a forum for those wishing to contact other Commodore fans.

INPUT

INPUT

Please can you tell me how to SAVE a machine code program at an address outside BASIC so that I can load it directly later on.

Suppose I POKE in, either directly or by a BASIC program from DATA lines, a 100-byte machine code program starting at address 52000 ($CB20). If I use a monitor (e.g. CBM Macro Assembler Development System), I can, of course, SAVE the machine code program by ".S "PROGRAM",08,CB20,CB84". I can then load it later by "LOAD" PROGRAM",8,1", without using the monitor.

Can I get the same result directly from BASIC, i.e. without resorting to the monitor to SAVE? If so, please could you tell me how to do it.
M.W. Peters
Dorset

OUTPUT

Store the machine code in the area of memory between addresses $C000 and $CFFF (i.e. 49152 and 53247 decimal). After the machine code has been POKEd into memory, calculate the hi and lo-bytes of the start and end of your machine code program in decimal.

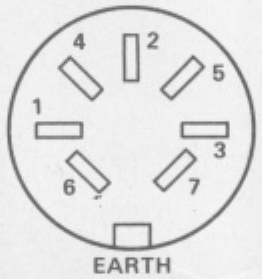
Then, POKE locations 43 and 44 with the hi and lo bytes of the start of the routine, POKE location 45 with the lo byte +1 at the end of the code and location 46 with the hi-byte. Then, to avoid an out of memory erro, the area where the variables start must be altered thus:
POKE 55 with the same value as location 45
POKE 56 with the same value as location 46
Finally, type in SAVE "program name",1,1 and either reset the values to what they were before else switch the machine off and on again.

INPUT

After searching for several weeks to find a suitable RGB cable to connect my 64 to an Hitachi 1444 TV/Monitor, I eventually located a source but I was appalled at the retail price of £9.99. I would therefore appreciate some advice on how to connect up the pins on the relevant DIN sockets (shown below) with a view to constructing my own cable.
Ian Parker
Tyne and Wear

OUTPUT

The Hitachi plug is on RGB format and the monitor appears to be composite video so, unfortunately, no connection can be made.



1. RED INPUT
2. GREEN INPUT
3. BLUE INPUT
4. SYNC INPUT (–VE)
5. EARTH
6. SOUND INPUT
7. N/C

HITACHI DIN PLUG



1. LUMINANCE
2. GND
3. AUDIO OUT
4. VIDEO OUT
5. AUDIO IN

'64 AUDIO/VIDEO DIN PLUG

INPUT

In the last issue of Your Commodore, you included a program listing of Cherry Picker by F.G. Tout. As I own a Commodore 64, and was interested in this game, I was disappointed to discover that this program was for cassette and not disc. I have the Commodore Disc Drive 1541 and would like to load the program on to disc. Could you please tell me the best way to do this? The content of this magazine is the best of any dedicated to the Commodore 64 – keep up the good work!
M.J. Oxley
Wimbledon

OUTPUT

This is very simple. Replace the LOAD in 1300 of part 1 with LOAD "P2",8. Replace the LOAD in 61160 with LOAD "P3",8 in part 2. Name the 3 programs Cherry, P2, P3.

INPUT

On page 67 of the December 84 issue, I read of a device called a 'Sequential Circuits Model 64 Sequencer'. I am a musician and very interested in the MIDI system. If I could drive it from my 64, I would be ecstatic.

The device I refer to has never been heard of in the software marketing stores in Australia (which I expected) so could you please forward me the address and details of where I could get one from or import it.
Peter Lake
Australia

OUTPUT

Sequential Circuits are an American firm whose products are definitely available in Australia. I suggest that you phone around some of the larger music or computer stores in Queensland. They should be able to help you.

I am trying to start a user group for the Commodore 1520 printer/plotter with the aim of exchanging programs, hints/tips, etc.. I would be grateful if you could mention this on the letters/news page of your magazine.

Anyone interested should contact me at the following address (S.A.E.) or on:
Prestel Mailbox: 782279612
Compunet Courier: SCB 1
Steven Birks
86 Birches Head Road
Birches Head
Stoke-on-Trent
ST1 6LJ

Please could you include details of our user group. It is the Southport Commodore Computer Users Group which has now been going for 18 months.

We should like to establish regular contact with groups in the United Kingdom to help us overcome the shortage of up-to-date information, as magazines from the UK are usually 3 months old before they become available here.
S.C.C.U.G.
Box 790
Southport
Queensland
Australia 4215

I should like to exchange experience, information, programs and literature about the Commodore 64. My name is Andrija Kolundzic. In Belgrade, I have organised the first and biggest club for personal computer fans. I have held courses in BASIC and machine language for Sinclair and Commodore computers. I have already taught 2000 pupils and am working with another 2000. I have also held courses on Yugoslavian TV and radio.

I am now writing a book on BASIC and machine language for the Sinclair Spectrum and Commodore 64. It will be the first book of its kind in Serbo-Croat (Yugoslavia's native language). I also contribute to two Yugoslavian personal computer magazines – Yu-Video and The World of Computers.

I own a Sinclair Spectrum, Commodore 64 and Commodore VIC 20, 3 disc drives, and 4 printers (VC 1515, VC 1526, MPS 801, Coex 80 F/T and over 1000 original programs. I also have two modems (Westbridge 6420 and VICMODEM) and I wish to communicate through the telephone network. I am also a radio amateur; my call number is YUI PUR.

If you are interested in getting in touch, you can contact me at the following address:
Andrija Kolundzic
Vojvode Brane 31/4/44
11000 Belgrade
Yugoslavia

We should appreciate your mentioning the newly formed 'Christian Micro Users Association'. We hope not only to link together a large number of Christian micro users but also to promote the use of micros in church related activities.

Anyone interested can send a large SAE to:
Christian Micro Users Association
6 Walkely Street
Sheffield S6 3RG.

We will send a sample magazine and further details.
P.A. Clark (Secretary)
Sheffield

OUTPUT

PROGRAMMING PROJECTS

In this month's project, Garry Marshall shows how to add a professional touch to your programs with three-dimensional shapes.

MANY DIFFERENT SORTS OF PROGRAMS need to display realistic three-dimensional shapes. A computer-aided design program must be able to do this, so that its users can examine the shape of the object that they are designing. Adventure games with convincing graphics have a considerable edge over text-based games. For these, and other programs, it is useful to have at hand a simple means of generating the shapes.

One way of generating three-dimensional shapes is to start with the profile of an object, such as the one shown in Figure 1, and to rotate it through a complete circle about a vertical axis. Figure 2 shows how this simple procedure generates a three-dimensional object. It can be simpler, and rather more effective, to create the object by rotating its profile to equally spaced positions around the circle and to draw it in each of these positions. Figure 3 shows the plan view (with the axis of rotation at the centre) of the situation when six equally spaced positions around the circle are used, and Figure 4 shows the resulting object with six facets.

The project is to write a program that will accept a number of facets, and will then draw the three-dimensional object with the given number of facets that is produced by rotating the profile. Figure 5 shows the sort of results that the program can give.

First steps

We shall begin by preparing the facilities that the solution program will need to call on. Obviously, the program will need to display its results on the high-resolution graphics screen, and so it will help to have a subroutine to prepare the 64 to do this. We have used a routine for this in an earlier project. With a reminder that it takes a fair time to do its job, a subroutine for this, starting at line 500, is shown in Subroutine 1.

The drawings of the three-dimensional shapes will be composed of straight lines. This means that it will be a good idea to have a subroutine for drawing a straight line that we can call on. It will work by drawing a dot at every position along the path of the line from one end to the other. We have used a

```
500 POKE 53272, PEEK(53272) OR 8
510 POKE 53265, PEEK(53265) OR 32
520 FOR I=8192 TO 16192: POKE I, 0:NEXT I
530 FOR I=1024 TO 2023: POKE I, 22:NEXT I
540 RETURN
```

Subroutine 1

```
1000 RO=INT(R/8): CO=INT(C/8)
1010 L=R AND 7
1020 BIT=7 - (C AND 7)
1030 BYTE=8192+RO*320+CO*8+L
1040 POKE BYTE, PEEK(BYTE) OR 2↑BIT
1050 RETURN
```

Subroutine 2

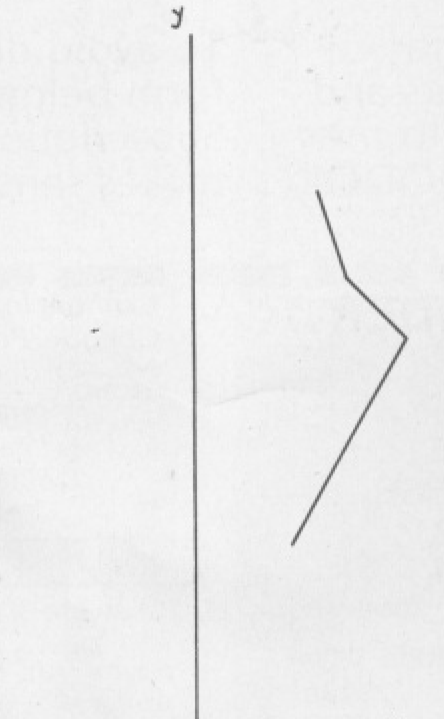


Figure 1 Profile

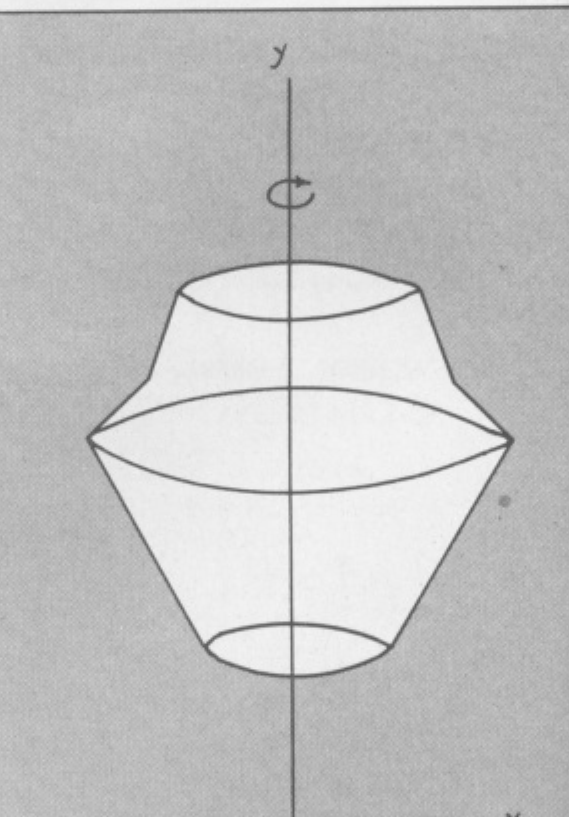


Figure 2 Object generated by rotating profile

Subroutine 3

```
2000 DX=X2-X1: DY=Y2-Y1
2010 IF DX=0 THEN 2070
2020 FOR C=X1 TO X2 STEP SGN(DX)
2030 R=INT(Y1+(C-X1)*DY/DX)
2040 GOSUB 1000
2050 NEXT C
2060 RETURN
2070 C=X1
2080 FOR R=Y1 TO Y2 STEP SGN(DY)
2090 GOSUB 1000
2100 NEXT R
2110 RETURN
```

Subroutine 4

```
10 READ N
20 DIM X(N), Y(N)
30 DIM XP(N), YP(N)
40 DIM NX(N), ZN(N), X3(N), Y3(N)
50 FOR K=1 TO N
60 READ X(K), Y(K)
70 NEXT K
80 DATA 9
90 DATA 10, 20, 9, 16, 7, 12, 2, 8
100 DATA 2.5, 4, 3, 0, 5,-4, 6,-8, 9,-12
```

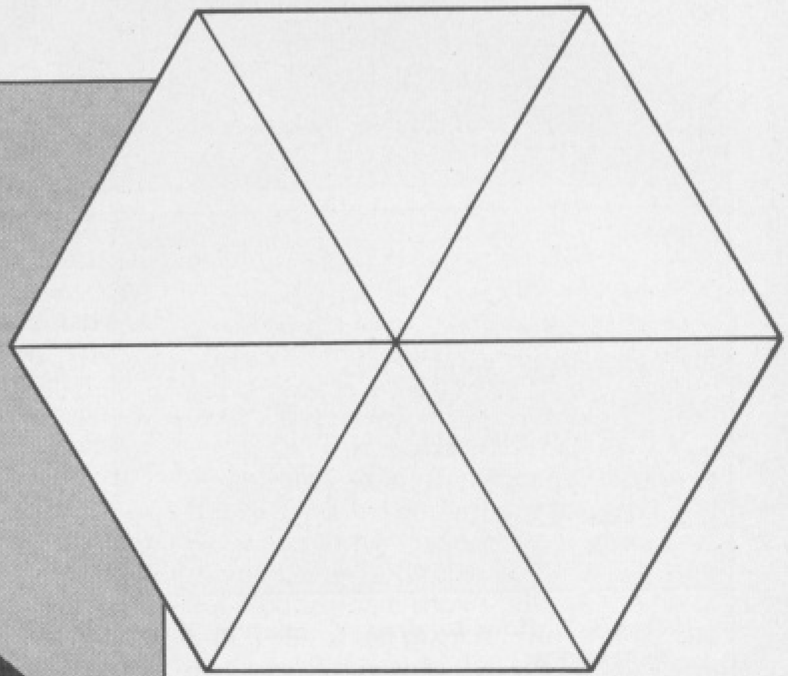
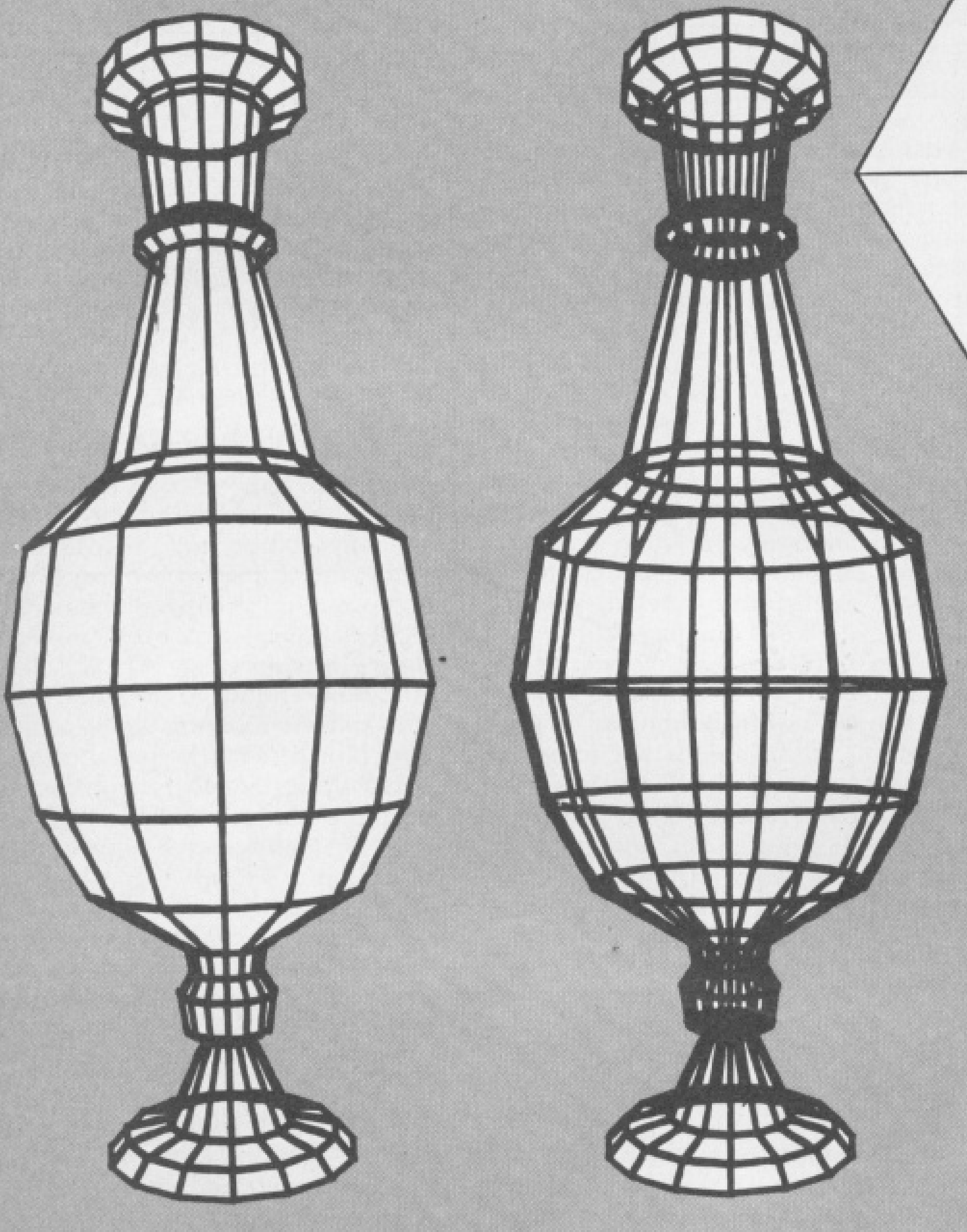


Figure 3 Positions for six-faceted rotation

Figure 5 Typical results from the program



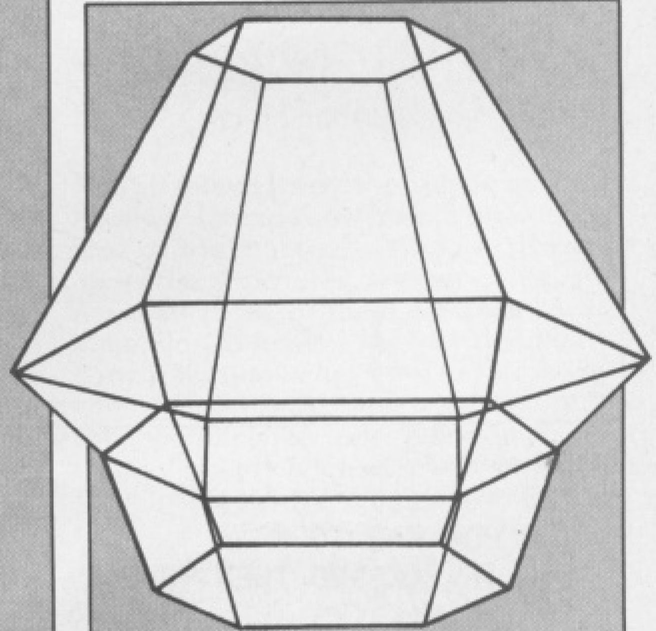


Figure 4 Object generated with six facets

routine for plotting a dot in column C and row R on the screen in an earlier project. It is shown in Subroutine 2.

A subroutine for drawing a line only needs to keep feeding the appropriate values for C and R to this subroutine. Figure 6 shows the relationship between C and R for the points along a line between the points (X1, Y1) and (X2, Y2). The difference between the y-coordinates of the end points of the line is stored under DY and the difference between the x-coordinates under DX. The slope of the line is then given by DY/DX. Line 2010 is needed to avoid division by zero when a line is vertical: it causes a branch to line 2070 where the instructions for drawing a vertical line begin. The subroutine for drawing a line from (X1, Y1) to (X2, Y2) by drawing a dot at the appropriate position in every column from column X1 to column X2 is shown in Subroutine 3.

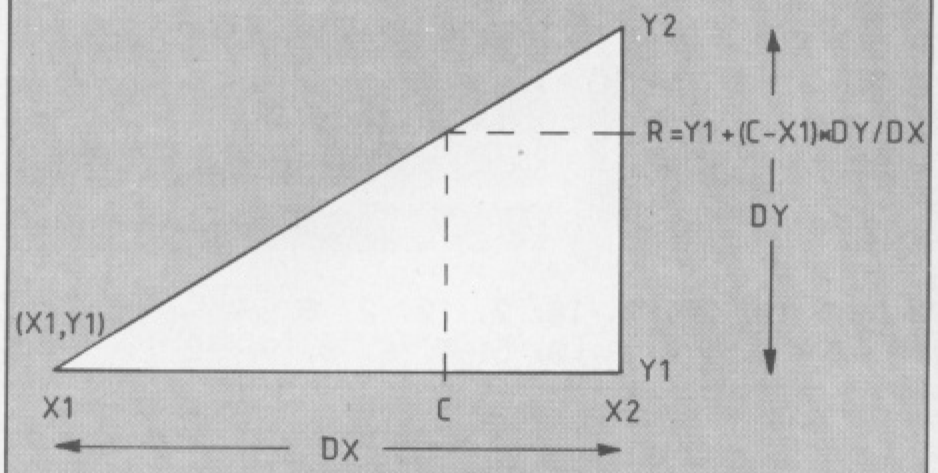


Figure 6 Positions for the points along a line

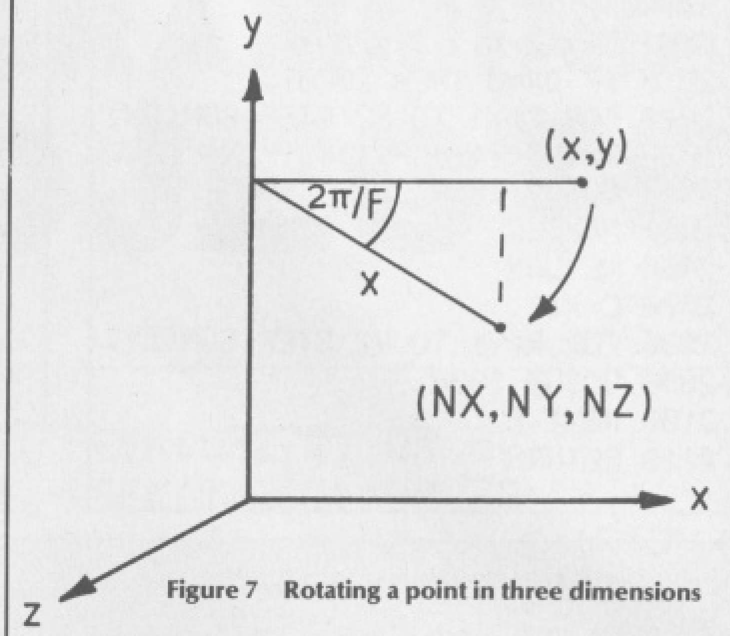


Figure 7 Rotating a point in three dimensions

Subroutine 6

```
220 X1=160+X(1): Y1=Y(1)
230 FOR J=2 TO N
240 X2=160+X(J): Y2=Y(J)
250 GOSUB 2000
260 X1=X2: Y1=Y2
270 NEXT J
```

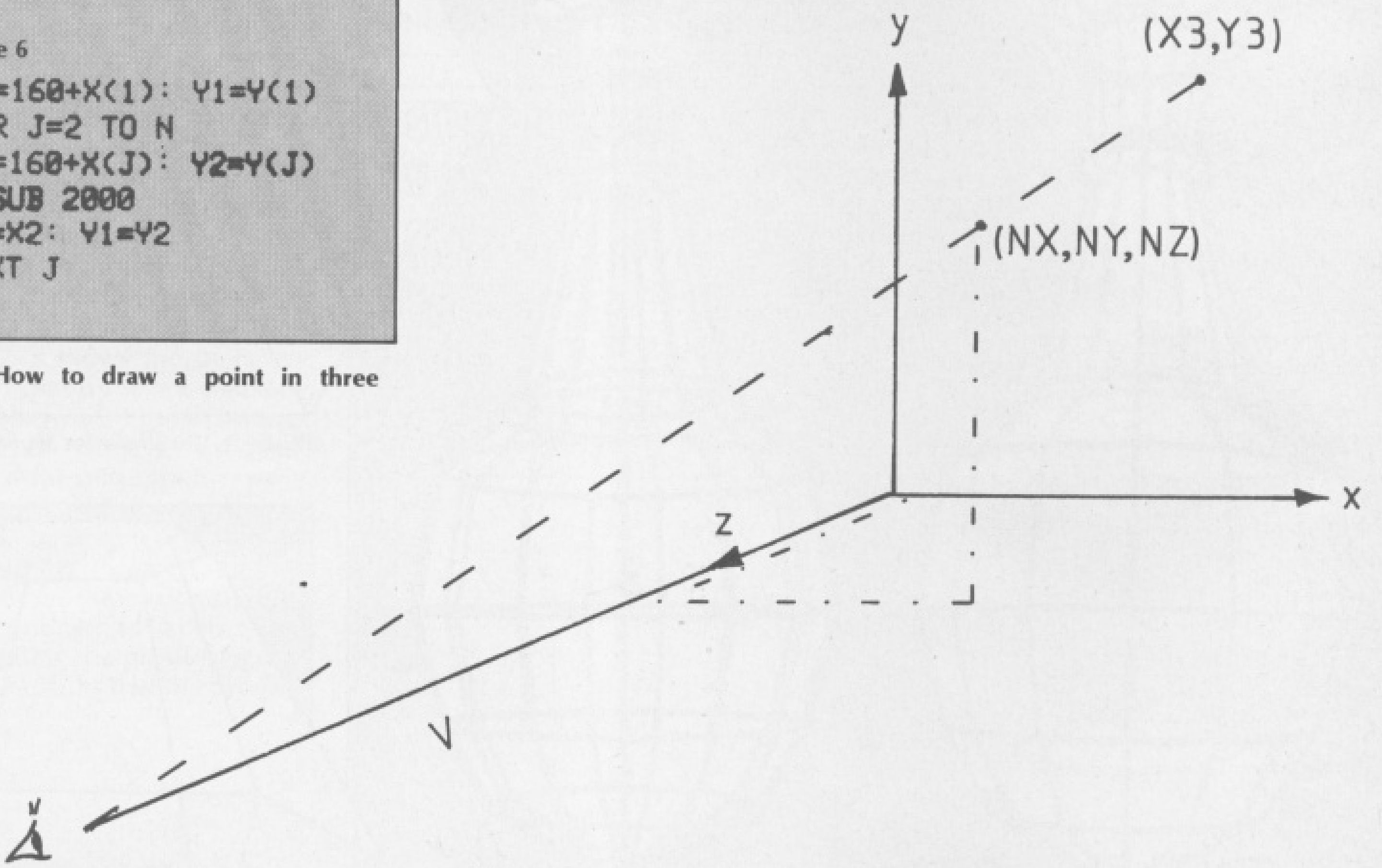


Figure 8 How to draw a point in three dimensions

Subroutine 5

```
120 YG=Y(1): YS=Y(1)
130 FOR K=2 TO N
140 IF Y(K)>YG THEN YG=Y(K)
150 IF Y(K)<YS THEN YS=Y(K)
160 NEXT K
170 FOR K=1 TO N
180 X(K)=X(K)*120/(YG - YS)
190 Y(K)=40+(YG - Y(K))*120/(YG - YS)
200 XP(K)=X(K): YP(K)=Y(K)
210 NEXT K
```

Subroutine 8

```
 30 DIM XP(N), YP(N)
200 XP(K)=X(K): YP(K)=Y(K)
390 FOR K=1 TO N
400 X1=160+XP(K): Y1=YP(K)
410 X2=160+X3(K): Y2=Y3(K)
420 GOSUB 2000
430 NEXT K
440 FOR K=1 TO N
450 XP(K)=X3(K): YP(K)=Y3(K)
460 NEXT K
```

Subroutine 7

```
 40 DIM NX(N), ZN(N), X3(N), Y3(N)
280 FOR REP=1 TO F
290 FOR K=1 TO N
300 NZ(K)=X(K)*SIN(2*π*REP/F): NX(K)=X(K)*COS(2*π*REP/F)
310 X3(K)=NX(K)/(1-NZ(K)/500): Y3(K)=Y(K)/(1-NZ(K)/500)
320 NEXT K
330 X1=160+X3(1): Y1=Y3(1)
340 FOR J=2 TO N
350 X2=160+X3(J): Y2=Y3(J)
360 GOSUB 2000
370 X1=X2: Y1=Y2
380 NEXT J
470 NEXT REP
```

Writing the program

With these tools ready for when we need them, we can begin to write the program. The first things to do are to get the number of facets for the three-dimensional object and to get its profile. The program can get the number of facets with the INPUT statement:

```
0 INPUT "NUMBER OF FACETS"; F
```

The profile can be described by a number of points which, when joined, give the profile. We could enter the number of points on the profile and the points themselves with INPUT statements, but it seems more convenient to READ them from DATA statements. If we first read the number of points along the profile into N, we can then use this value to dimension arrays X and Y to hold the x- and y- coordinates of the points before reading the coordinate values into them. This is done with Subroutine 4.

There are gaps in the line numbers that we shall fill later when we declare more arrays. For the moment, we have the data that the program needs to carry out its task, and we can prepare the computer to display the result by:

```
110 GOSUB 500: REM SET UP HI-RES SCREEN
```

before going on to work out how to compute that result.

With the data describing the profile, the numbers may not be at all convenient for the 64's high-resolution screen: they may make the profile appear very small, or they may make it too large for the screen. We ought to scale the numbers so that, no matter what they may be, they give a display that fits the screen.

Next, the program scales the data so that the y-coordinates (or row numbers) range from 40 to 160. The numbers of the screen rows range from 0 to 199, so our choice for the scaling ensures that the displayed object will be of a good size and centrally located on the screen. The x-coordinates (or column numbers) are scaled by the same factor as the y-values.

In the following lines, the greatest value of a y-coordinate is found and stored under YG while the smallest is stored under YS. Then the data is multiplied by 120/(YG-YS) so that it occupies a range of 120 (that is, 160-40) rather than from YS to YG, and 40 is added to the y-values to make them range from 40 to 160 as required – see Subroutine 5.

At this point, we can draw the profile by interfacing the scaled data values to our line-drawing subroutine. Since the column numbers on the high-resolution screen range from 0 to 319, we add 160 to the x-coordinates of the profile so that it appears positioned with reference to the centre of the screen rather than to the left-hand side. The lines necessary to draw the scaled profile shown in Subroutine 6.

When you are entering the program, this is a good place to pause to test it. But, make sure that you have saved it first for, if there is a mistake, particularly in the routine for setting the high-resolution screen, it can cause the program to be lost.

Shape creation

Rotating the profile to generate the three-dimensional shape, requires a little geomoetry and the ability to visualise the situation as it occurs in three dimensions. There is nothing particularly difficult about it, and it can all be seen with the help of a couple of diagrams.

First of all, imagine what happens to a point on the profile as it is rotated to a new position. If there are to F facets, the points will be rotated by 2*PI/F to get to its first new position. (Rotating it by twice this amount will take it to the second position, by three times to the third position, and so.) The point is rotated about the vertical axis, but kept at the same height.

We now need three coordinates to fix the position of the point in three dimensions. The position is shown in Figure 7. The x- and y-coordinates of the new point are measured in the same directions as for the original profile, and the z-coordinate shows how far the point is in front of the plane of the profile. The diagram shows that the coordinates NX, NY and NZ of the new point are related to the coordinates x, y of the point on the profile by:

NX=x*cos(2*PI/F)
NY=y
NZ=x*sin(2*PI/F)

This tells us where the point moves to. Now we want to know how to draw it, for we cannot actually create three-dimensional pictures, we can only draw representations of them on a flat (two-dimensional) screen. The way that this is done is illustrated in Figure 8. This shows where we must draw the point corresponding to our point in three dimensions when we want it to be in the same plane as the original profile. As before, a little observation of the right-angle triangles in the diagram shows that the coordinates X3 and Y3 of the point that we should draw are given by:

X3=NX/1(1-NZ/V)
Y3=NY/1(1-NZ/V)

(V is the distance of the observer from the plane containing the profile, as shown in Figure 8. It is given the value 500 in the program as this produces a satisfactory display.)

The profile can now be repeatedly rotated and drawn in each of its positions.

The arrays NX, NY, X3 and Y3 are declared in line 40. The profile is drawn using the same code as was used to draw the original profile but with reference to X and Y replaced by X3 and Y3. Although it would seem preferable to write a subroutine for this, instead of repeating the code, the contents of arrays would have to be swapped around to interface the subroutine to the program. As only a few lines are involved, it is simpler to repeat them. This gives us Subroutine 7.

Running the program as it stands now will give a fairly convincing display, but it is improved considerably if each of the points that is used to describe the profile is joined to the corresponding point on the next profile. Adding these lines considerably improves the apparent solidity of the resulting image. To add the lines, we must save the points on the previous profile so that they are available when the new one is drawn. The x- and y-coordinates, respectively, of the previous profile are saved in arrays named XP and YP. These arrays are declared at line 30, initialised at line 200, used to draw the required lines in lines 390 to 430, and updated for the next time in lines 440 and 460 – see Subroutine 8.

The entire program is listed in Figure 9.

Further developments

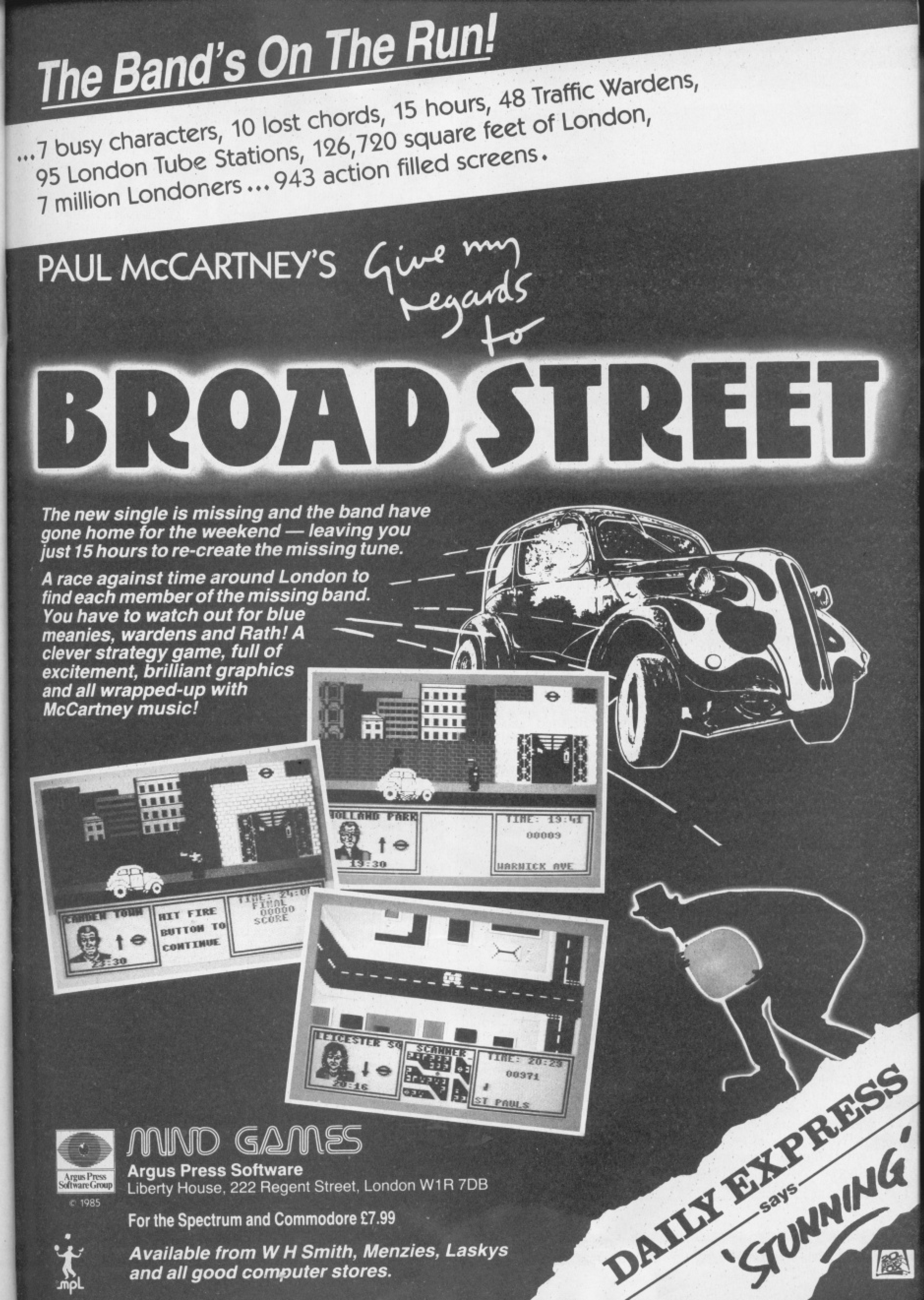
The ways in which you can extend and enhance the program include the following.

- The line-drawing subroutine can be improved by drawing a dot in every row, rather than in every column as at present, if the slope of the line is greater than one.
- The program can be amended so that it does not draw the lines that would be hidden from the viewer, showing only the visible facets. This can be done by changing the number of repetitions required by line 280.
- The scaling system can be changed. Different scalings can be used for the x- and y-coordinates to produce a distorted image of the object for display.
- If you can fill in some of the facets with colour, it will enhance the display.
- The points need not be rotated round a circular path, but can take positions on an ellipse of some other curve. A 'crinkly' curve will give interesting results.
- Different kinds of perspective to the one of line 310 can be used.

Program Listing

```
0 INPUT "NUMBER OF FACETS"; F
10 READ N
20 DIM X(N), Y(N)
30 DIM XP(N), YP(N)
40 DIM NX(N), ZN(N), X3(N), Y3(N)
50 FOR K=1 TO N
60 READ X(K), Y(K)
70 NEXT K
80 DATA 9
90 DATA 10, 20, 9, 16, 7, 12, 2, 8
100 DATA 2.5, 4, 3, 0, 5,-4, 6,-8, 9,-12
110 GOSUB 500: REM SET UP HI-RES SCREEN
120 YG=Y(1): YS=Y(1)
130 FOR K=2 TO N
140 IF Y(K)>YG THEN YG=Y(K)
150 IF Y(K)<YS THEN YS=Y(K)
160 NEXT K
170 FOR K=1 TO N
180 X(K)=X(K)*120/(YG - YS)
190 Y(K)=40+(YG - Y(K))*120/(YG - YS)
200 XP(K)=X(K): YP(K)=Y(K)
210 NEXT K
220 X1=160+X(1): Y1=Y(1)
230 FOR J=2 TO N
240 X2=160+X(J): Y2=Y(J)
250 GOSUB 2000
260 X1=X2: Y1=Y2
270 NEXT J
280 FOR REP=1 TO F
290 FOR K=1 TO N
300 NZ(K)=X(K)*SIN(2*π*REP/F): NX(K)=X(K)*COS(2*π*REP/F)
310 X3(K)=NX(K)/(1-NZ(K)/500): Y3(K)=Y(K)/(1-NZ(K)/500)
320 NEXT K
330 X1=160+X3(1): Y1=Y3(1)
340 FOR J=2 TO N
350 X2=160+X3(J): Y2=Y3(J)
360 GOSUB 2000
370 X1=X2: Y1=Y2
380 NEXT J
390 FOR K=1 TO N
400 X1=160+XP(K): Y1=YP(K)
410 X2=160+X3(K): Y2=Y3(K)
420 GOSUB 2000
430 NEXT K
440 FOR K=1 TO N
450 XP(K)=X3(K): YP(K)=Y3(K)
460 NEXT K
470 NEXT REP
480 GOTO 480
500 POKE 53272, PEEK(53272) OR 8
510 POKE 53265, PEEK(53265) OR 32
520 FOR I=8192 TO 16192: POKE I, 0: NEXT I
530 FOR I=1024 TO 2023: POKE I, 22: NEXT I
540 RETURN
1000 RO=INT(R/8): CO=INT(C/8)
1010 L=R AND 7
1020 BIT=7 - (C AND 7)
1030 BYTE=8192+RO*320+CO*8+L
1040 POKE BYTE, PEEK(BYTE) OR 2↑BIT
1050 RETURN
2000 DX=X2-X1: DY=Y2-Y1
2010 IF DX=0 THEN 2070
2020 FOR C=X1 TO X2 STEP SGN(DX)
2030 R=INT(Y1+(C-X1)*DY/DX)
2040 GOSUB 1000
2050 NEXT C
2060 RETURN
2070 C=X1
2080 FOR R=Y1 TO Y2 STEP SGN(DY)
2090 GOSUB 1000
2100 NEXT R
2110 RETURN
```

Figure 9 The complete program


The Band's On The Run!
...7 busy characters, 10 lost chords, 15 hours, 48 Traffic Wardens, 95 London Tube Stations, 126,720 square feet of London, 7 million Londoners ... 943 action filled screens.
PAUL McCARTNEY'S Give my regards to
BROAD STREET
The new single is missing and the band have gone home for the weekend — leaving you just 15 hours to re-create the missing tune.
A race against time around London to find each member of the missing band. You have to watch out for blue meanies, wardens and Rath! A clever strategy game, full of excitement, brilliant graphics and all wrapped-up with McCartney music!
HOLLAND PARK
13:30
TIME: 13:41
00003
WARWICK AVE
CAMDEN TOWN
22:30
HIT FIRE BUTTON TO CONTINUE
FINAL
00000
SCORE
LEICESTER SQ
20:16
SCANNER
TIME: 20:29
00371
ST PAULS
MIND GAMES
Argus Press Software Group
Argus Press Software
Liberty House, 222 Regent Street, London W1R 7DB
© 1985
For the Spectrum and Commodore £7.99
mpl
Available from W H Smith, Menzies, Laskys and all good computer stores.
DAILY EXPRESS says 'STUNNING'

THE BASIC FACTS

A.P. and D.J. Stephenson tie together the subroutines which form the basis of a filing system into a complete program.

LAST MONTH, WE DEALT with a few of the major subroutines which might form the basis of a complete filing system. This article is devoted entirely to one program which fits them together. Although the program is complete in itself, it is hoped that you will alter it to suit your own needs and perhaps add additional options. It is written for tape files but it would be a simple matter to change the OPEN statements to suit disc based files. The complete listing is shown as Program 9.1

Using the program

On first running the program, the complete menu of options is displayed although, at first there are only two possible choices: create a file or load an existing file, providing of course that one exists on tape. If any other option is selected, the "No file loaded" message is displayed and the menu regained by pressing any key.

Option 1: Create file

The first screen message asks for an estimate of the maximum number of records expected and the number of fields in a record. If you have just keyed in the program and you are in the testing stage, you should try out the program first with, say, ten records and three fields to produce a test data tape. It would be rather foolish to start creating a long and valuable data file before the program has been fully tested using all options with a short dummy test file.

Next, you will be asked to enter the file headings. We suggest NAME, TELEPHONE and OCCUPATION for the test file. But, there is a little snag. In order for the sort function to operate correctly on numerical columns, you must enter, where necessary, sufficient leading zeros to make all numbers contain the total number of digits. This is because all numbers are converted to strings. These preliminaries over, you will be asked to enter the actual data under each field heading. The current record number is always displayed at the top of the screen while data is being entered. When the current keyboard session is ended, key in EXIT to regain the menu page. Remember, you don't have to complete the whole file in one sitting. As soon as you are tired, you can save the file in its unfinished state and reload it later to carry on where you left off. The only difference is that you will then be adding new records to an existing file so you will need Option 5, 'Add records' instead of Option 1, 'Create records'.

Option 2: Load file

This can be a dangerous option to choose because any file already existing in RAM would be destroyed by overwriting it with the new file. To guard against using this by mistake, you are warned of the danger and can get out of the mess and regain the menu by pressing any key other than the space bar. Once you press the space bar, the new file starts to load over the existing file – so think carefully!

Option 3: Save file

You supply the file name, which must not exceed 16 characters. You must arrange the controls of the cassette unit and the winding position of the tape used to receive the file.

Option 4: Display file

Before saving a file, it is comforting to look at it. before actually committing it to Option 4 will do this for you by displaying a page of records at a time. The key field is always present, but any one of the other fields can be rotated into view by using the cursor keys. (This was explained in last month's issue when we described most of the subroutines in detail.

Option 5: Add records

As mentioned above, this is used to add further records to a file already existing in RAM. The record number displayed at the top of the screen indicates the number of the one you are about to add.

Option 6: Modify any field

We all make mistakes so this will be a popular option. You will be asked for the keyfield of the offending record. The first one or two characters are sufficient, and then the particular field which requires modification. The field data must then be completely re-entered. To ensure the correction has gone in, have a peep at the file using Option 4.

Option 7: Sort by any field

Humans like things in order, particularly alphabetical or numerical order. When you enter data into a file, it is far too much trouble to re-arrange the data in order before it is entered. Also, it would be quite out of the question to re-enter the entire file because a newcomer, Thomas J, has to be entered between Thatcher M and Thrower P. Obviously, we should make the computer earn its keep and make it do the sorting afterwards – hence, Option 7.

To ensure maximum versatility, the file can be sorted under any field heading. For example, we may, for some reason known only to ourselves, like the file to be arranged in alphabetical order under OCCUPATION instead of name or perhaps, numerical order under TELEPHONE. Because of this, the question "Operate on which field?" must be answered. If you want to sort under TELEPHONE, it is sufficient to enter TE or even T. The entire file will then be sorted in numerical order of telephone number, providing of course the leading zeros were correctly entered.

Option 8: Check bytes free

When the number of records begins to grow – and they will – you should often take advantage of this option to see how many bytes are left. We could have made this a permanent feature at the top of the 'Add records' display but this involves continuous housekeeping delays while the

BASIC interpreter cleans up the debris. By using a separate option, the delay is more likely to be tolerated.

Option 9: Delete record

The record to be deleted is found on receipt of the first one or two characters of the keyfield. The 'hole' in the file is automatically closed up so you don't have to worry about wasted RAM space.

Programming details

The listing consists of the collection of subroutines which we treated in some depth last month. All that was needed to turn them into Program 9.1 were a few bits and pieces such as initialisation lines and a menu. Figure 9.1 is a simplified structure diagram of the program and will help you to understand the overall plan and, in particular, how to trace the GOSUB numbers from the ON GOSUB statement.

Line 200 is a trap again inadvertent selection of certain options when there is no file present.

Suggestions for files

Having a filing system is one thing but knowing what to file is another. A file on names, telephone and occupation was quite suitable as a simple example but, in practice, it would be rather a banal exercise. The following suggestion may be useful as a guide to the kind of information worth putting on a computer.

The British have a lust for magazines of all types including, of course, computer monthlies. A pile of magazines can grow to an alarming height because most of us can't bear to throw any of them away just in case some particular article has to be looked up. The trouble comes when you want to find the elusive article. To avoid periodic bouts of frustration it is worth spending a few hours (or days) putting all the article headings into some kind of order. Program 9.1, plus some dedicated keyboard work, will do just that.

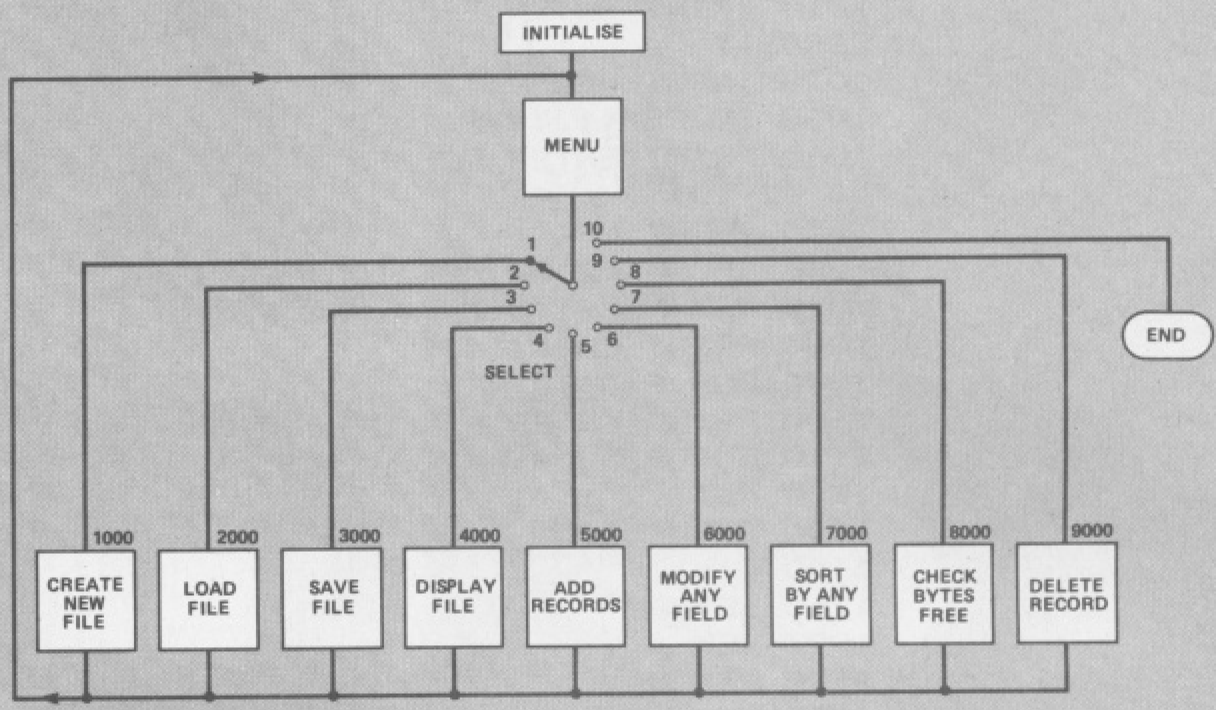


Figure 9.1 Structure diagram of the program

Program Listing

```
10 REM RAM FILING SYSTEM FOR CASSETTE
20 F1%=0:FL%=0:N$="FILE NOT NAMED"
30 GOSUB 12000
40 GOSUB16000
50 PRINT"(1)  CREATE NEW FILE"
60 PRINT"(2)  LOAD FILE"
70 PRINT"(3)  SAVE FILE"
80 PRINT"(4)  DISPLAY FILE"
90 PRINT"(5)  ADD RECORDS"
100 PRINT"(6)  MODIFY ANY FIELD"
110 PRINT"(7)  SORT BY ANY FIELD"
130 PRINT"(8)  CHECK BYTES FREE"
140 PRINT"(9)  DELETE RECORD"
150 PRINT"(10) END PROGRAM"
160 PRINT:PRINT:INPUT"SELECT OPTION ";S%
170 PRINT CHR$(147)
180 IF S%<1 OR S%>10 THEN 40
190 IF S%<3 AND F1=1 THEN 11000
200 IF S%>2 AND FL%=0 AND S%<>10 THEN PR
INT"NO FILE PRESENT":GOSUB15000:RUN
210 ON S% GOSUB 1000,2000,3000,4000,5000
,6000,7000,8000,9000,230
220 GOTO40
230 END
997 REM *
998 REM **
999 REM CREATE FILE SUBROUTINE
```

```
1000 PRINT CHR$(147)
1010 PRINT"ENTER FILE SIZE (NUMBER OF RE
CORDS)"
1020 INPUT FS%
1030 IF FS%<1 THEN 1010
1040 PRINT"ENTER NUMBER OF FIELDS REQUIR
ED (2-10)"
1050 INPUT NF%
1060 IF NF%<2 OR NF%>10 THEN 1040
1070 NF%=NF%-1:DIM A$(NF%,FS%)
1080 PRINT CHR$(147)
1090 FOR F=0 TO NF%
1100 PRINT"ENTER FIELD HEADING";F+1
1110 GOSUB25000:A$(F,0)=K$
1130 NEXT
1140 GOSUB5000
1150 F1=1
1160 RETURN
1997 REM *
1998 REM **
1999 REM LOAD FILE SUBROUTINE
2000 INPUT"ENTER FILENAME ";N$
2010 OPEN 1,1,0,N$
2020 INPUT#1,FS%,NF%,FL%
2030 DIM A$(NF%,FS%)
2040 FOR R=0 TO FL%
2050 FOR F=0 TO NF%
2060 INPUT#1,A$(F,R)
2070 NEXT:NEXT
2080 F1=1
2090 CLOSE1
2100 RETURN
2997 REM *
2998 REM **
2999 REM SAVE FILE SUBROUTINE
3000 INPUT"ENTER FILENAME ";N$
3010 OPEN 1,1,1,N$
3020 PRINT#1,FS%:PRINT#1,NF%:PRINT#1,FL%
3030 FOR R=0 TO FL%
3040 FOR F=0 TO NF%
3050 PRINT#1,A$(F,R)
3060 NEXT:NEXT
3070 CLOSE1
3080 RETURN
3997 REM *
3998 REM **
3999 REM DISPLAY FILE SUBROUTINE
4000 C=1:S=1
4010 PRINT CHR$(147):PRINT"PRESS SPACE B
AR TO REGAIN MENU
4020 PRINT L$
4030 PRINT A$(0,0) TAB(20) A$(C,0)
4040 PRINT L$:SS=S+17
4050 IF SS>FL% THEN SS=FL%
4060 FOR R=S TO SS:PRINT A$(0,R) TAB(20)
 A$(C,R):NEXT
4070 GET K$:IF K$="" THEN 4070
4080 IF K$=CHR$(32) THEN 4180
```

```
4090 IF K$="L" THEN C=C-1
4100 IF K$="R" THEN C=C+1
4110 IF K$="U" THEN S=S-18
4120 IF K$="D" THEN S=S+18
4130 IF C<1 THEN C=NF%
4140 IF C>NF% THEN C=1
4150 IF S<1 THEN S=(INT(FL%/18)*18)+1
4160 IF S>FL% THEN S=1
4170 GOTO4010
4180 RETURN
4997 REM *
4998 REM **
4999 REM ADD RECORDS SUBROUTINE
5000 PRINT CHR$(147):IF FL%>=FS% THEN PR
INT"FILE FULL":GOSUB15000:GOTO5120
5010 FL%=FL%+1
5020 PRINT"TYPE (EXIT) TO FINISH ENTRY O
F RECORDS"
5030 PRINT
5040 PRINT"RECORD NUMBER ";FL%
5050 PRINT:PRINT:F=-1
5060 F=F+1
5070 PRINT A$(F,0)
5080 GOSUB25000:A$(F,FL%)=K$
5090 IF A$(F,FL%)="EXIT" THEN FL%=FL%-1:
GOTO5120
5100 IF F<NF% THEN 5060
5110 IF FL%<FS% THEN 5000
5120 RETURN
5997 REM *
5998 REM **
5999 REM MODIFY FIELD SUBROUTINE
6000 GOSUB14000:GOSUB13000:PRINT CHR$(14
7)
6010 PRINT"RECORD CONTAINING SELECTED FI
ELD":PRINT:PRINT L$
6020 FOR C=0 TO NF%
6030 PRINT A$(C,0) TAB(20) A$(C,R)
6040 NEXT
6050 PRINT L$:PRINT
6060 PRINT"CURRENT CONTENTS OF FIELD"
6070 PRINT A$(F,R):PRINT
6080 PRINT"ENTER NEW CONTENTS"
6090 GOSUB25000:A$(F,R)=K$
6100 RETURN
6997 REM *
6998 REM **
6999 REM SORT FILE SUBROUTINE
7000 GOSUB13000
7010 IF FL%<2 THEN 7160
7020 PRINT CHR$(147):PRINT"SORTING BY ";
A$(F,0)
7030 N%=FL%
7040 N%=(N%+2)/3
7050 FOR D=N%+1 TO N%*2
7060 FOR E=D TO FL% STEP N%
7070 FOR R=E TO D STEP -N%
7080 IF A$(F,R)>A$(F,R-N%) THEN 7130
```

```
7090 FOR C=0 TO NF%
7100 K$=A$(C,R):A$(C,R)=A$(C,R-N%):A$(C,
R-N%)=K$
7110 NEXT
7120 NEXT
7130 NEXT E
7140 NEXT
7150 IF N%>1 THEN 7040
7160 RETURN
7997 REM *
7998 REM **
7999 REM BYTES FREE SUBROUTINE
8000 PRINT CHR$(147):PRINT"WAIT":PRINT
8010 X=FRE(0)-(SGN(FRE(0))<0)*65535
8020 PRINT"NUMBER OF BYTES FREE";X
8030 GOSUB15000
8040 RETURN
8997 REM *
8998 REM **
8999 REM DELETE RECORD SUBROUTINE
9000 GOSUB14000
9010 PRINT CHR$(147)
9020 PRINT"RECORD TO BE DELETED":PRINT:P
RINT L$
9030 FOR C=0 TO NF%
9040 PRINT A$(C,0) TAB(20) A$(C,R)
9050 NEXT
9060 PRINT L$:PRINT
9070 PRINT"DELETE THIS RECORD (Y/N)"
9080 GOSUB25000
9090 IF K$<>"Y" THEN 9170
9100 IF FL%=1 THEN 9160
9110 FOR F=0 TO NF%
9120 A$(F,R)=A$(F,R+1)
9130 NEXT
9140 R=R+1
9150 IF R<FL% THEN 9110
9160 FL%=FL%-1
9170 RETURN
10997 REM *
10998 REM **
10999 REM SECOND CHANCE SUBROUTINE
11000 PRINT"CAUTION : OPTION DESTROYS LO
ADED FILE"
11010 PRINT:PRINT
11020 PRINT"PRESS SPACE BAR TO CLEAR FIL
E"
11030 PRINT:PRINT"PRESS ANY OTHER KEY TO
 REGAIN MENU"
11040 GET K$:IF K$="" THEN 11040
11050 IF K$=CHR$(32) THEN RUN
11060 GOTO40
11997 REM *
11998 REM **
11999 REM DRAW LINE SUBROUTINE
12000 L$=""
12010 FOR K=1 TO 39
12020 L$=L$+CHR$(99)
12030 NEXT
```

```
12040 RETURN
12997 REM *
12998 REM **
12999 REM FIND FIELD SUBROUTINE
13000 PRINT CHR$(147):F=-1
13010 PRINT"OPERATE ON WHICH FIELD? (GIV
E HEADING)"
13020 GOSUB25000
13030 F=F+1
13040 IF K$=LEFT$(A$(F,0),LEN(K$)) THEN
13070
13050 IF F<NF% THEN 13030
13060 PRINT CHR$(147):PRINT"NO SUCH FIEL
D":GOSUB15000:GOTO13000
13070 RETURN
13997 REM *
13998 REM **
13999 REM FIND RECORD SUBROUTINE
14000 PRINT CHR$(147):R=0
14010 IF S%=6 OR S%=9 THEN F=0
14020 PRINT"GIVE RECORD ENTRY UNDER ";A$
(F,0)
14030 GOSUB25000
14040 R=R+1
14050 IF K$=LEFT$(A$(F,R),LEN(K$)) THEN
14080
14060 IF R<FL% THEN 14040
14070 PRINT CHR$(147):PRINT"NO SUCH RECO
RD":GOSUB15000:GOTO14000
14080 RETURN
14997 REM *
14998 REM **
14999 REM PRESS ANY KEY SUBROUTINE
15000 PRINT:PRINT"PRESS ANY KEY TO CONTI
NUE"
15010 GET K$:IF K$="" THEN 15010
15020 RETURN
15997 REM *
15998 REM **
15999 REM TITLE/STATUS SUBROUTINE
16000 PRINT CHR$(147):PRINT L$
16010 PRINT"    COMPACT RAM BASED FILING
 SYSTEM"
16020 PRINT L$
16030 IF F1=0 THEN PRINT"FILE NOT PRESEN
T"
16040 IF F1=1 THEN PRINT"FILE LOADED: ";
N$
16050 PRINT
16060 RETURN
24997 REM *
24998 REM **
24999 REM INPUT VALIDATION SUBROUTINE
25000 K$="":INPUT K$
25010 IF K$="" THEN 25000
25020 IF LEN(K$)>18 THEN K$=LEFT$(K$,18)
25030 RETURN

READY.
```

COMP

Want a holiday but can't bear to be parted from your Commodore? Our prize should solve such a dilemma.

ATTENTION ALL PLEASURE-SEEKING, young Your Commodore readers! OK, so you're not allowed to drink in pubs or drive a car or do any of those legal things which waste so much of us older folk's time. But, this month at least, you are the privileged group of Your Commodore readers. For, only if you are 16 years of age or under will June's star prize be of any value to you. Of course, mum or dad or an older friend may enter – but, they can't keep the prize.

Consider waterskiing, fishing, swimming, tennis, sailing and .. computers! If you think this is an unlikely mixture you've never heard of Ardmore Adventure holiday camps.

Ardmore are out to prove that education can be fun. On one of their special adventure holidays, you will spend 2-3 hours at the computer and the rest of the day taking part in a whole host of leisure activities such as badminton, basketball, BMX biking, dancing, drama, fencing, judo, pottery, rifle shooting, sailing, swimming, treasure hunts and lots, lots more. There's something to suit every taste.

The camps are small enough to ensure that the campers receive personal care and attention but large enough to offer a wide range of activities and opportunities to meet new people with similar interests.

Those who choose computing as a specialist activity (and we're sure any Your Commodore reader will) are taught to program under expert supervision. There is one computer (plus peripherals) per child and a teacher for every 5 pupils. There is no rigid syllabus; every child is encouraged to proceed at their own pace. The camp even awards proficiency certificates for progress and skills in specialist activities and courses.

There is a choice of residential or non-residential camps. They are held at three main sites – Sherbourne School in Dorset, Newland Park in Chalfont St. Giles and at Ascot. There are three age groups – 4-6 years, 7-11 years and 12-16 years. What a golden opportunity for parents to get rid of their kids for a week (or, more to the point, a chance for kids to escape from their parents!).

Why are we telling you all this? Yes, you've guessed, we're offering one lucky prize winner a week's holiday at one of Ardmore's activity camps. The holiday will be at their Chalfont St. Giles centre and should be taken at the end of August. The second prize is an Ardmore summer camp sweatshirt and the third prize an Ardmore summer camp T-shirt.



David Walker, Camp Director

How to enter

It's so simple. All you have to do is answer five easy multiple choice questions and write the answers clearly on the back of the envelope in which you send your entry otherwise we will not be able to accept it. The answers should be written on the envelope in the same order as the questions. There is no need to write the question numbers on the back of the envelope. For example, if you think the answer to question number 1 is John McEnroe, then the first letter will be C, and so on.

Since this is an activity holiday, the questions are all connected to sport. You may enter as many times as you wish but each entry must be on an official coupon and sealed in a separate envelope. Please write clearly on the coupon as it will be used as a label if you win a prize.

Fill in your answers, name and address on the entry coupon and send it to Ardmore Competition, Your Commodore, 1 Golden Square, London W1R 3AB. The closing date for the competition is last post on Friday 28th June.

Questions

1) Which of the following tennis players has won the Wimbledon Men's Singles title 5 times?
   a) Bjorn Borg
   b) Rod Laver
   c) John McEnroe

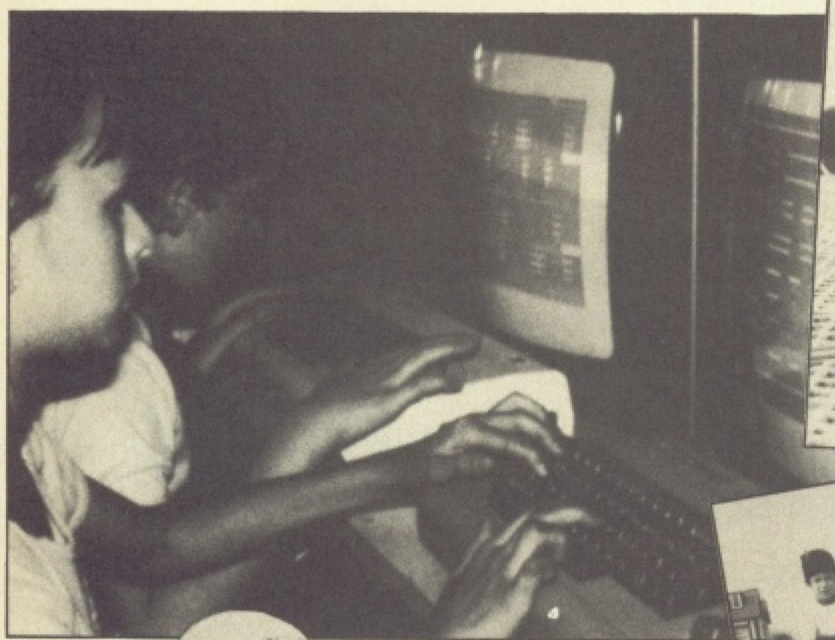
2) Which football team have their home ground at Old Trafford?
   a) Arsenal
   b) Southampton
   c) Manchester United

3) For which county does Ian Botham play cricket?
   a) Yorkshire
   b) Kent
   c) Somerset

4) Who won the 500cc Grand Prix World Championship in 1984?
   a) Eddie Kidd
   b) Eddie Lawson
   c) Nigel Lawson

5) Where were the 1984 Olympic Games held?
   a) Rome
   b) Los Angeles
   c) Moscow

PETITION





Snowless skiing

Fun at your fingertips



Hold your horses



On your bike

The Rules

Entries will not be accepted from employees of Argus Specialist Publications Ltd., their printers and distributors, and Ardmore Adventure Ltd. This restriction also applies to employees' families and agents of the companies.

No correspondence will be entered into with regard to the competition results and it is a condition of entry that the editor's decision is final.

The How to Enter section forms part of the rules.

Ardmore Adventure Competition

To give yourself a sporting chance, fill in the entry coupon (block letters please).

Name ....

Address

....

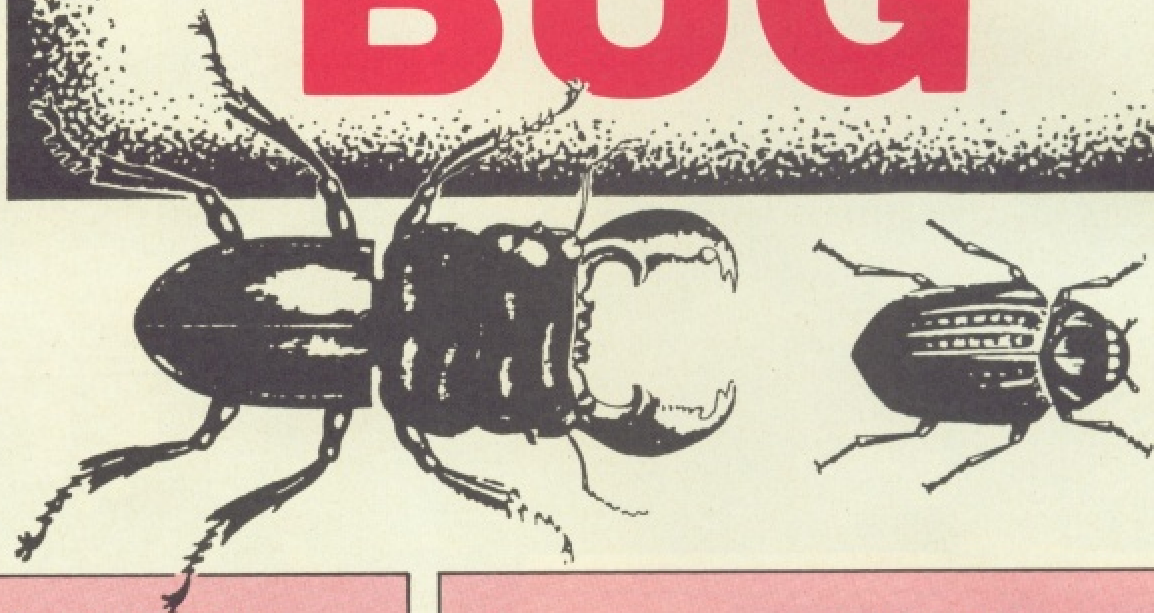
.... Postcode.........

My answers are ....

Remember to write your answers on the back of the envelope or your entry will be invalid.

Be warned – there are bugs in this game from F.G. Tout. Fortunately, they are only ladybirds and beetles.

LADY BUG



LAVINIA THE LADYBIRD JUST loves to eat grass. However, the beetles just love to eat ladybirds. Your task is to guide Lavinia through 12 gardens eating the grass and avoiding the beetles. If she eats too much, you can cure her indigestion by eating a flower and score an extra 100 points. Unfortunately, this will speed up the beetles. You score 10 points for each turf Lavinia eats.

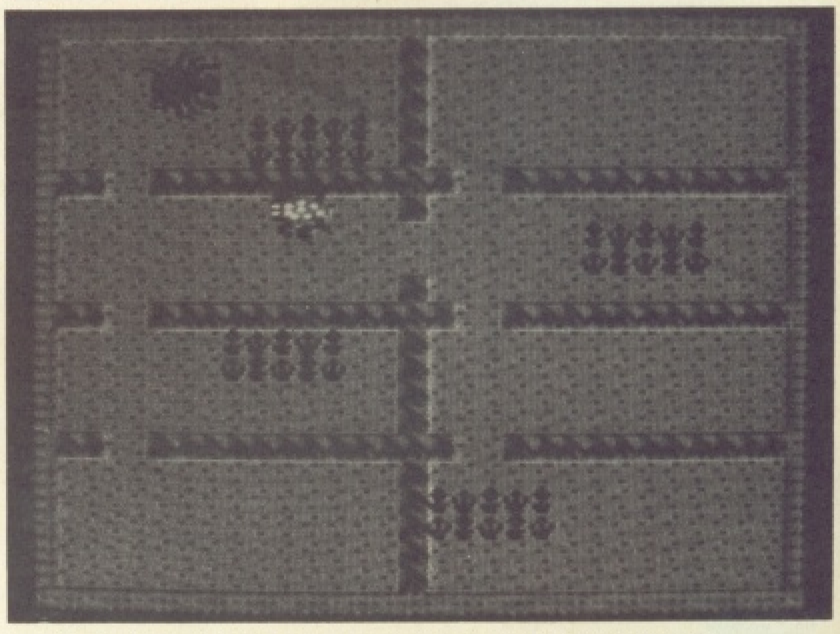
To load press shift/run stop. Move Lavinia by using the joystick in Port 2. Lavinia has 5 lives.

15 - 250	Redefine Characters
300 - 430	Redefine Alphabet
999 -	Sprite Data

10 - 390	Music interrupt and data
39999 - 43070	Machine Code (REMmed)
49999 -	Instructions

4	Sound on, Call interrupt, etc.
5	Gosub Variables
10	Set special multi-colour mode, screen colours
15	Special position and memory location
20 - 30	Define functions
40	Call screens
50 - 75	Main Routine
80 - 85	Screen position of Lavinia
510 - 585	Variables
600 - 620	Check Score, lives etc.
700 - 740	Sound effects
826 - 910	Lives lost routine
1000 - 4030	Screens 1 -12
4100 - 4140	Task completed
10000 - 10024	Garden cleared?
11000 - 11015	Game over
11020 - 11030	Name for high score
1200 -	Beetle positions
60000 -	Title page

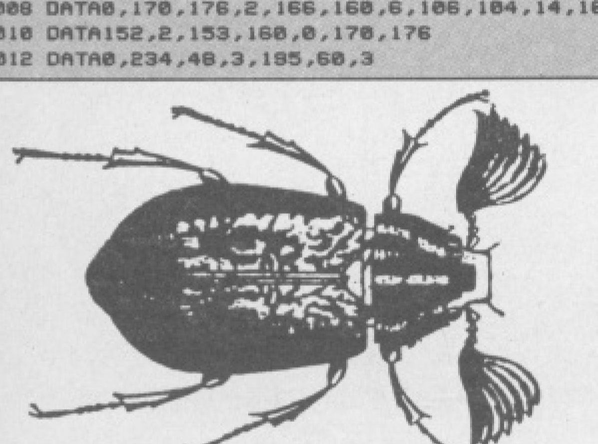
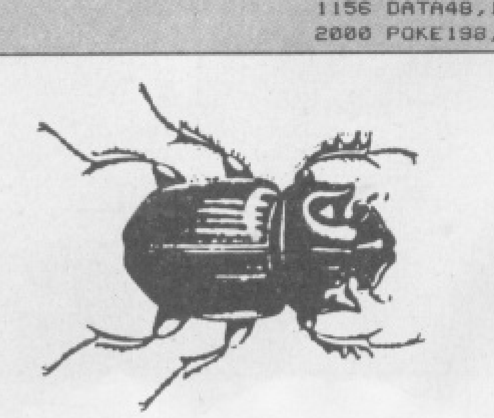
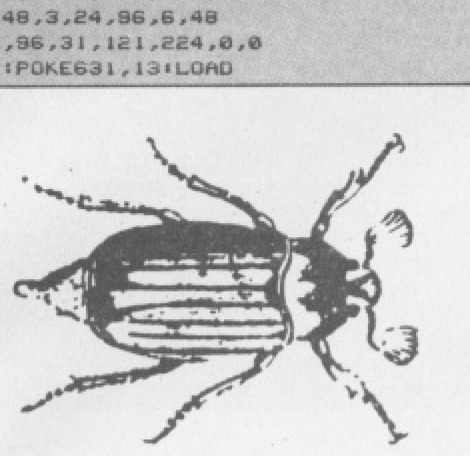
V	Sprite data
S1,S2,S3	Sound
M1	Machine code Address
C	Colour for sun and amount eaten
EA	Amount of grass eaten
S	Score
L1	Lives
GA	Garden number
HI	High score
SP	Speed of beetles
GG, T, I	Other variables
KK	amount of grass to eat per garden



Lavinia just about to be pounced on by a rather large beetle.

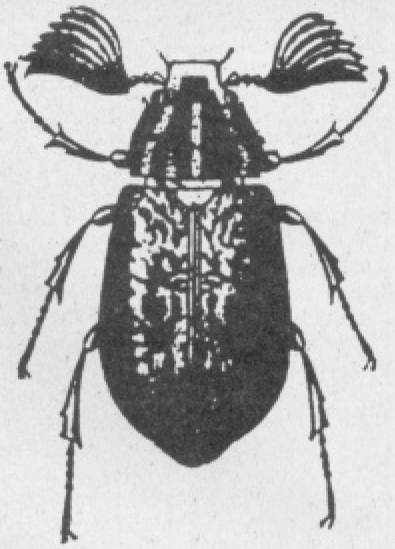
Program Listing 1

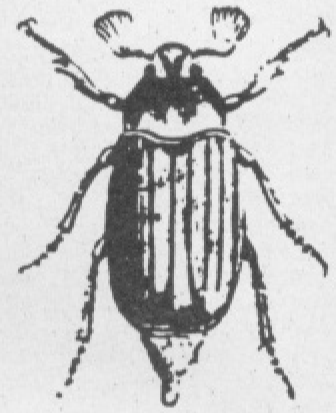
```
65535 REM CLR-BLK
0 PRINT"█LADYBUG":POKE53280,2:POKE53281,2
1 REM****************************************
2 REM****************************************
3 REM****************************************
4 REM*              LADYBUG                 *
5 REM*            BY F G TOUT               *
6 REM*               1984                   *
7 REM****************************************
8 REM****************************************
9 REM****************************************
15 REM***REDEFINE CHARACTERS***
20 POKE56334,PEEK(56334)AND254
30 POKE1,PEEK(1)AND251
40 FORG=0TO64*8:POKE12288+G,PEEK(53248+G):NEXT
50 POKE1,PEEK(1)OR4
60 POKE56334,PEEK(56334)OR1
100 READA%:T=T+1:IFA%<>-1THENPOKE12288+G+T,A%:GOTO100
101 FORI=0TO60*8STEP8:A=12288+1+I:B=PEEK(A):POKEA,B AND6:NEXT
102 DATA0,0,0,0,0,0
105 DATA255,251,255,223,255,255,247,255
110 DATA223,198,227,225,196,134,51,123
115 DATA191,219,119,218,127,237,183,238
120 DATA254,255,254,108,254,255,254,108
125 DATA68,238,255,255,238,255,255,238
130 DATA54,127,255,127,54,127,255,127
135 DATA118,255,255,118,255,255,118,34
140 DATA239,199,147,198,238,171,167,199
145 DATA255,238,199,109,109,171,167,199
150 DATA255,255,255,255,255,255,255,255
160 DATA129,66,24,60,60,24,66,129
165 DATA24,56,56,118,238,239,118,60
170 DATA7,31,61,125,123,251,247,255
180 DATA224,248,188,190,222,223,239,255
185 DATA255,147,251,123,125,61,31,7
190 DATA255,239,223,222,190,188,248,224
195 DATA3,7,7,15,31,127,255,255
200 DATA192,224,224,240,248,254,255,255
205 DATA255,255,127,31,15,7,7,3
210 DATA255,255,254,248,240,224,224,192
250 DATA-1
299 REM*****NEW ALPHABET*****
300 FORI=0TO215:READA:POKE12288+I,A:NEXT
305 DATA0,0,0,0,0,0,0,0
310 DATA48,124,108,126,118,102,102,0,48,124,108,126,118,102,126,0
320 DATA60,108,108,96,96,118,62,0,120,108,118,118,118,108,120,0
330 DATA126,118,96,124,96,118,126,0,126,118,96,124,100,112,112,0
340 DATA60,118,96,110,118,126,60,0,108,110,118,126,102,118,118,0
350 DATA124,56,24,28,28,30,62,0,62,30,28,12,108,120,56,0
360 DATA110,108,124,112,124,108,110,0,96,96,112,112,112,124,62,0
370 DATA54,119,127,107,118,119,119,0,54,118,122,126,111,119,119,0
380 DATA62,103,115,118,103,115,62,0,126,103,115,126,96,112,112,0
390 DATA62,103,115,115,115,62,15,0,126,115,103,126,124,102,103,0
400 DATA62,115,97,62,67,103,62,0,127,60,24,24,28,28,28,0
410 DATA103,103,71,103,102,126,60,0,103,103,103,71,102,62,28,0
420 DATA118,119,107,107,127,119,54,0,103,118,62,28,62,119,103,0
430 DATA115,51,62,24,24,28,28,0,126,15,12,24,48,127,63,0
999 REM**SPRITE DATA**
1000 FORI=0TO255+256:READA:POKE210*64+I,A:NEXT
1002 DATA0,0,0,0,48,0,12
1004 DATA60,0,15,12,192,3,15
1006 DATA240,3,195,48,0,234,48
1008 DATA0,170,176,2,166,160,6,106,104,14,166,160,6,106
1010 DATA152,2,153,160,0,170,176
1012 DATA0,234,48,3,195,60,3
1014 DATA15,12,3,204,0,0,207
1016 DATA0,0,3,0,0,0,0,0
1022 DATA0,0,0,0,3,0,0
1024 DATA207,0,3,204,0,3,15
1026 DATA12,3,195,60,0,234,48
1028 DATA0,170,176,2,166,160,6,106,104,10,166,
     160,6,106
1030 DATA152,2,153,160,0,170,176
1032 DATA0,234,48,3,195,48,3
1034 DATA15,240,15,12,192,12,60
1036 DATA0,0,48,0,0,0,0,0
1042 DATA0,0,0,0,3,0,0
1044 DATA15,12,0,204,60,3,252
1046 DATA46,3,48,240,3,42,192
1046 DATA3,170,128,2,166,160,10,106,100,10,166,
     172,9,170
1050 DATA100,2,153,160,0,170,128
1052 DATA3,42,192,15,48,240,12
1054 DATA60,46,0,12,240,0,60
1056 DATA192,0,48,0,0,0,0,0
1062 DATA0,0,0,0,48,0,0
1064 DATA60,192,0,12,240,12,60
1066 DATA48,15,46,240,3,42,192
1068 DATA3,170,128,2,166,160,10,106,100,10,166,
     168,9,170
1070 DATA100,2,153,160,0,170,128
1072 DATA3,42,192,3,48,240,3
1074 DATA252,48,0,204,60,0,15
1076 DATA12,0,3,0,0,0,0,0
1080 DATA0,7,128,0,12,0,240
1082 DATA25,224,24,51,0,204,102
1084 DATA126,102,204,224,55,248,184
1086 DATA63,255,0,63,254,28,127
1088 DATA255,190,127,255,248,127,255
1090 DATA248,127,255,190,63,254,28
1092 DATA63,255,0,103,249,140,198
1094 DATA204,216,12,102,126,248,51
1096 DATA0,0,25,224,0,15,128,0
1100 DATA0,30,0,0,48,0,0
1102 DATA99,192,240,102,0,24,198
1104 DATA126,204,204,252,103,249,128
1106 DATA63,255,0,63,254,28,127
1108 DATA255,190,127,255,254,127,255
1110 DATA254,127,255,190,63,254,28
1112 DATA63,255,0,103,249,128,198
1114 DATA204,248,124,198,126,0,102
1116 DATA0,0,99,192,0,60,0,0
1120 DATA1,130,0,0,198,0,0
1122 DATA204,0,0,204,62,224,204
1124 DATA96,48,204,252,223,249,128
1126 DATA127,255,0,63,254,28,127
1128 DATA255,190,127,255,248,127,255
1130 DATA248,127,255,190,63,254,28
1132 DATA127,255,0,223,249,128,49
1134 DATA140,248,225,140,96,1,140
1136 DATA62,1,134,0,3,2,0,0
1140 DATA0,0,0,125,192,0,6
1142 DATA96,30,3,48,48,1,152
1144 DATA96,224,204,252,63,249,128
1146 DATA63,255,0,63,254,28,127
1148 DATA255,190,127,255,248,127,255
1150 DATA254,127,255,190,63,254,28
1152 DATA63,255,0,63,249,128,225
1154 DATA140,248,3,24,96,6,48
1156 DATA48,12,96,31,121,224,0,0
2000 POKE198,2:POKE631,13:LOAD
```

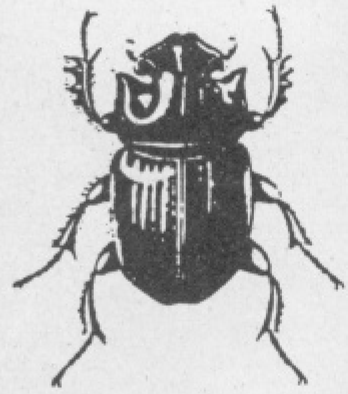




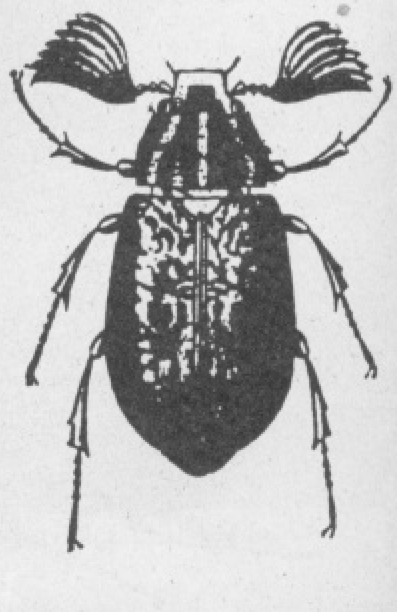
Program Listing 2

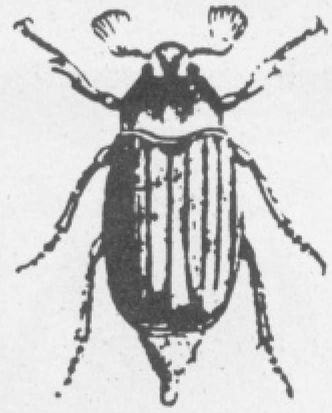
```
4 REM CLR
5 POKE53280,11:POKE53281,11:PRINT"J"
10 REM****MUSIC****
20 FORT=0TO2:FORX=0TO255:READA:IFA=-1THEN40
30 POKE36864+T*256+X,A:NEXTX
40 NEXTT
50 DATA169,146,141,21,3,169,0,141,20,3,96,-1
60 DATA169,234,141,21,3,169,49,141,20,3,96,-1
70 DATA172,0,147,192,17,240,57,206,1,147,173,1,147,201,0,208,44,238,0,147,169
75 DATA0,141,4,212,169,11,141,5,212,169,196,141,6,212,169,17,141,4,212,185,15
80 DATA167,185,0
90 DATA148,141,1,212,185,0,149,141,0,212,185,0,150
95 DATA141,1,147,76,49,234
100 DATA169,0,141,0,147,141,4,212,24,144,242,-1
110 POKE37632,0:POKE37633,0
120 FORT=0TO115:READHF,LF,DU
130 POKE37888+T,HF:POKE38144+T,LF:POKE38400+T,DU
140 NEXT:POKE37380,T+1
200 DATA25,177,12,25,177,10
210 DATA25,177,8,28,214,8,25,177,8,22,227,20
220 DATA21,154,16,22,227,20
230 DATA0,0,4,28,214,8,28,214,16,32,94,20,28,214,16,22,227,20
240 DATA25,177,10,0,0,8,22,227,20,25,177,8,21,154,10,19,63,12,28,214,40
250 DATA34,75,10,32,94,12,28,214,16,22,227,20,25,177,20,21,154,12,19,63,20
260 DATA17,37,20,21,154,12,19,63,10,17,37,16,28,214,16,32,94,10,34,75,16
275 DATA38,126,20,34,75,10,32,94,16,28,214,20,25,177,12,28,214,16,25,177,20
280 DATA25,177,16,22,227,20,25,177,16,22,227,20,21,154,10,19,63,10
285 DATA17,37,12,21,154,16,19,63,16,17,37,12,28,214,16,32,94,20,34,75,20
290 DATA38,126,10,43,52,12,38,126,12,32,94,16,28,214,12,25,177,16
300 DATA22,227,20,28,214,16,34,75,12,32,94,16,28,214,10,25,177,16
310 DATA22,227,20
320 DATA21,154,10,19,63,12,17,37,10,34,52,12,38,126,16,43,52,12,38,126,10
330 DATA34,75,10,43,52,12,38,126,12,34,75,16,32,94,20,28,214,16,32,94,12
340 DATA43,52,12,38,126,12,34,75,10,38,126,12,43,52,16,34,75,20
350 DATA38,126,16,43,52,12,38,126,16,34,75,10,32,94,12,34,75,10,32,94,12
360 DATA28,214,16,32,94,12,28,214,16,25,177,12,22,227,20,28,214,12
370 DATA32,94,12,34,75,10,38,126,14,43,52,16,38,126,14,34,75,10,32,94,12
380 DATA28,214,12,25,177,16,21,154,14
390 DATA19,63,20,17,37,20,21,154,14,19,63,20,17,37,80
39999 FORI=0TO40:READA:POKE49152+I,A:NEXT:REM****J/S****
40000 DATA173,0,220,201,126,208,3,32,98,192
40010 DATA201,125,208,3,32,148
40020 DATA192,201,123,208,3,32,198,192,201,119,208,3,32,248,192,32,192,193,96
40030 DATA232,224,0,208,236,96
40999 FORI=0TO197:READA:POKE49250+I,A:NEXT:REM**MOVE ME**
41000 DATA173,1,208,201,40,240,12,206,1,208,206,1,208,206,1,208,206,1,208
41010 DATA162,0,189,248,7,24,105,1,201,212,144,2,169
41020 DATA 210,157,248,7,232,224,1,208,236,96,0,0,0,0,0,0
41030 DATA 255,255,173,1,208,201,212,240,12,238,1,208,238
41040 DATA 1,208,238,1,208,238,1,208,162,0,189,248,7,24,105,1,201,214,144
41050 DATA 2,169,212,157,248,7,232,224,1,208,236,96,0,0,0,0,0,0
41060 DATA 255,255,173
42000 DATA 0,208,201,24,240,12,206,0,208,206,0,208,206
42010 DATA 0,208,206,0,208,162,0,189,248,7,24,105,1,201,214,144,2,169,212
42020 DATA 157,248,7,232,224,1,208,236,96,0,0,0,0,0,0,0
42030 DATA 0,173,0,208,201,240,240,12,238,0,208,238,0,208,238,0,208,238,0,208
42040 DATA162,0,189,248,7,24,105,1,201,212,144,2
42050 DATA 169,210,157,248,7,232,224,1,208,236,96,0,0,0,0,0,0
43000 FORI=0TO76:READA:POKE49600+I,A:NEXT:REM**MOVE & CHANGE BUGS**:END
43010 DATA162,2,189,1
43020 DATA208,24,105,1,157,1,208,201
43030 DATA245,144,6,173,4,220,157,0,208
43040 DATA232,232,224,16,208,231
43041 DATA162,2,189,0
43042 DATA208,24,105,1,157,0,208,201
43043 DATA245,144,6,173,4,220,157,1,208
43044 DATA232,232,224,16,208,231
43050 DATA162,1,189,248,7,24,105,1,201,218,144,2,169
43060 DATA214,157,248,7,232,224
43070 DATA8,208,236,96
44998 REM CLR
44999 PRINT"J":POKE53272,29:POKE53280,0:POKE53281,0
44999 REM HOM WHT RED CYN PUR GRN BLU YEL WHT CYN PUR GRN BLU YEL WHT
45000 PRINT"":PRINTTAB(16)"L A D Y  U G":PRINTTAB(14)"BY F  G T  U T"
45019 REM CRR-BLU CYN RED CYN CRR
45020 PRINT"LAVINIA,THE LADYBIRD IS HAVING A FEAST";
45029 REM CRR-WHT GRN WHT CRR
45030 PRINT"SHE JUST LOVES TO EAT GRASS,BUT THE    ";
45039 REM CRR-CYN RED CYN CRR
45040 PRINT"BEETLES JUST LOVE TO EAT LAVINIA!!!!  ";
45049 REM CRR-WHT BLU WHT GRN WHT CRR
45050 PRINT" GUIDE LAVINIA THROUGH 12 GARDENS AND ";
```









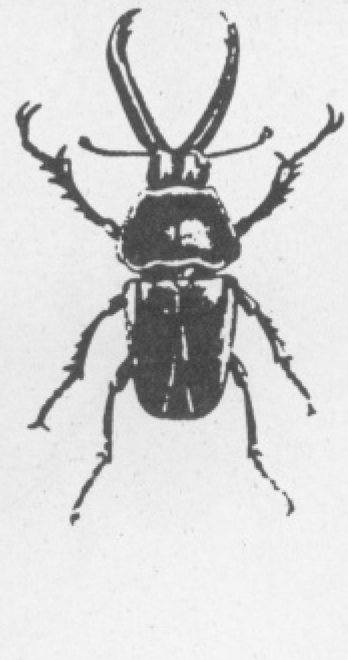


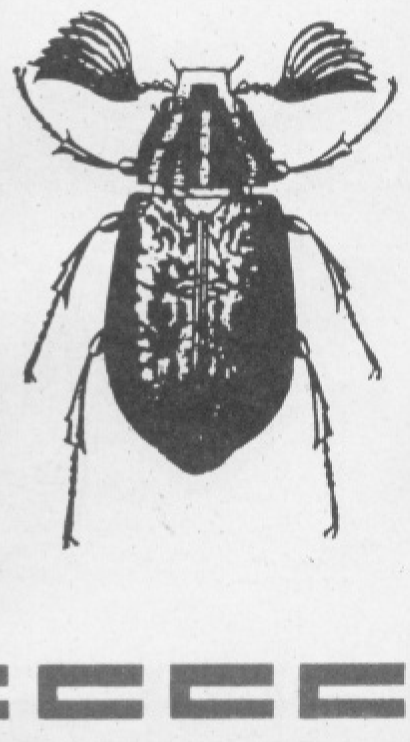
```
45054 REM CRR-CYN BLU CYN CRR
45055 PRINT"█▙EAT ALL THE GRASS,BUT IF █LAVINIA ▙EATS █";
45059 REM CRR-WHT YEL WHT CRR
45060 PRINT"██TOO MUCH SHE CAN EAT A █FLOWER█, DOING  █";
45064 REM CRR-CYN CRR
45065 PRINT"█▙SO WILL CLEAR HER INDIGESTION,BUT WILL█";
45069 REM CRR-WHT
45070 PRINT"██SPEED UP THE BEETLES."
45074 REM CRR-CYN CRR
45075 PRINT"█▙SHE CAN GO ON THE PATHS ,BUT SHE MIGHT█";
45079 REM CRR-WHT CRR
45080 PRINT"██GET BAKED BY THE HOT SUN.SCORE 10 PTS █";
45084 REM CRR-CYN CRR
45085 PRINT"█▙FOR EACH TURF LAVINIA EATS AND 100 PTS█";
45089 REM CRR-WHT CRR
45090 PRINT"██FOR EACH FLOWER.LAVINIA HAS 5 LIVES.  █";
45094 REM CRR-CYN CRR
45095 PRINT"█▙SUN AND AMOUNT EATEN ARE SHOWN AT THE █";
45099 REM CRR-WHT YEL GRN CRR
45100 PRINT"██BOTTOM OF THE SCREEN█/SUN█AMOUNT EATEN.█";
45109 REM CRR
45110 PRINT"█JOYSTICK PORT 2."
45119 REM CRU-CRR ORN BWN YEL BLU PUR RED
45120 PRINT"█   █NOW █PRESS █SHIFT█RUN█STOP █TO LOAD":POKE198,0
45499 REM BLK
45500 PRINT"█"
45600 END
```

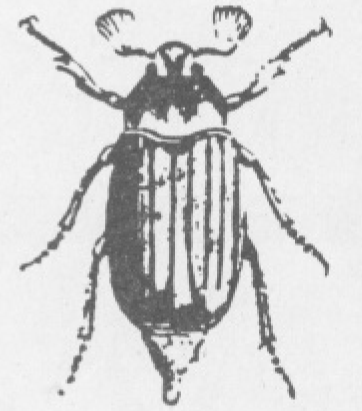
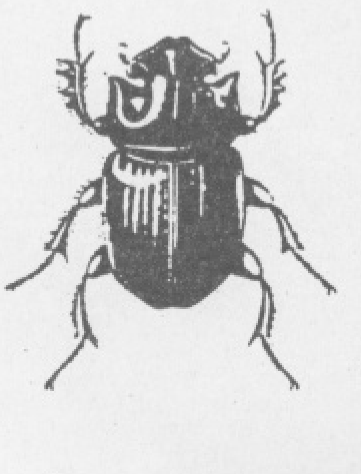
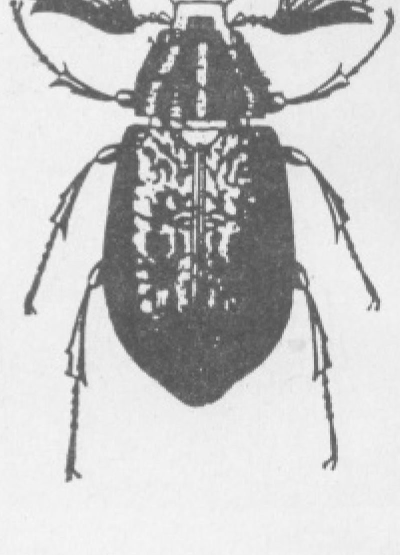


Program Listing 3

```
3 REM CLR
4 PRINT"█":POKE54296,15:SYS36864:GOSUB60000:POKE53272,29:LI=5:S=0:G=1:LE=1
5 GOSUB500
6 REM
10 POKEV+28,1:POKEV+37,1:POKEV+38,0:POKEV+39,2:POKE53280,0:POKE53281,0
15 POKEV,100:POKEV+1,100:POKE2040,210
20 DEFFNA(A)=INT(PEEK(V)/8)+INT(PEEK(V+1)/8)*40+822:J=FNA(A)
30 DEFFNC(C)=(PEEK(V+30)AND1)
40 ONLEGOSUB1000,2000,3000,3100,3200,3300,3400,3500,3600,3700,3800,4000,4100
42 IFFI=1THENGOTO4
46 POKE49607,SP:POKE49634,SP
50 SYSM1:GOSUB80:POKEG3+C,CO:POKEG4+C,C1:IFLI<1THENGOSUB11000:GOTO4
54 IFFNC(C)=UTHEN825
55 IFG3>G2THEN825
60 IFG4>1983THEN825
65 IFEA=KKTHENLE=LE+1:GOSUB10000:GOSUB40
75 GOTO50
80 J=FNA(A):IFPEEK(J)=DTHENPOKEJ,E:POKEJ+C,9:S=S+5:GOSUB700:U=1:GOSUB615:RETURN
82 IFPEEK(J)=66THENGOSUB710:U=2:RETURN
84 IFPEEK(J)>71THENPOKEJ,E:POKEJ+C,8:GOSUB720:GOSUB900:RETURN
85 RETURN
500 REM***VARS***
510 M1=49152:V=53248:C=54272:D=65:E=67:G1=1984:G2=2023:G3=1984:M2=49600
515 SP=1:CO=5:G4=1944:C1=7
520 S1=54290:S2=54291:S3=54287:FORI=54272TO54296:POKEI,0:NEXT:POKES1+6,15:SP=1
580 GG=255:FORI=3TO15STEP2:POKEV+I,GG:POKEV+I-1,0:GG=GG-31:NEXT
585 FORI=40TO46:POKEV+I,0:NEXT
589 RETURN
599 REM HOM YEL   2*CRD CYN   2*CRD
600 PRINT"█":PRINTTAB(34)"█SCORE██":PRINTTAB(34)"▙LIVES██"
604 REM   2*CRD   2*CRD
605 PRINTTAB(34)"GARDEN██":PRINTTAB(34)"HI-SC██"
609 REM HOM-  4*CRD-PUR   2*CRD-GRN   2*CRD-ORN   2*CRD
610 PRINT"██████":PRINT"███"TAB(34)LI:PRINT"███"TAB(34)GA:PRINT"██"TAB(34)HI
611 FORI=G1TOG2:POKEI,76:NEXT:FORI=1944TO1983:POKEI,75:POKEI+C,0:NEXT
614 REM HOM-  2*CRD   9*CRD
615 PRINT"███":PRINTTAB(34)S:G3=G3+.1:EA=EA+1:PRINT"██████████":PRINTTAB(34)HI:RE
TURN
620 RETURN
700 POKES1,128:POKES2,3:POKES3,205:POKES1,129:IFG3>2018THENCO=2
705 IFS>HITHENHI=S
707 RETURN
710 POKES1,32:POKES2,9:POKES3,5:POKES1,33:G4=G4+.2:RETURN
720 POKES1,16:POKES2,9:POKES3,30:POKES1,17:RETURN
730 POKES1,32:POKES2,44:POKES3,T:POKES1,33:RETURN
740 POKES1,32:POKES2,31:POKES3,T+10:POKES1,33:RETURN
824 REM CLR
825 PRINT"█"
826 BO=53280:POKE53281,1:FORT=250TO5STEP-5:POKEBO,T:GOSUB730:NEXT
```

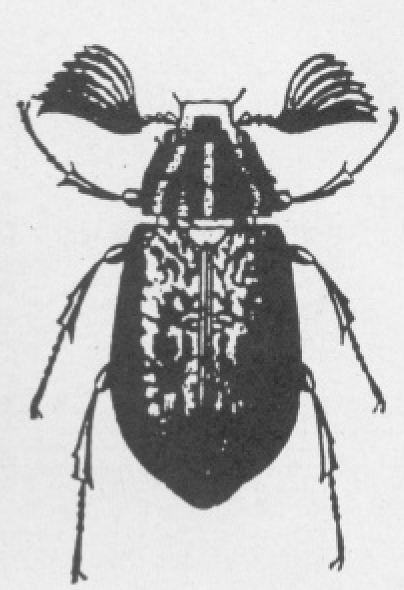


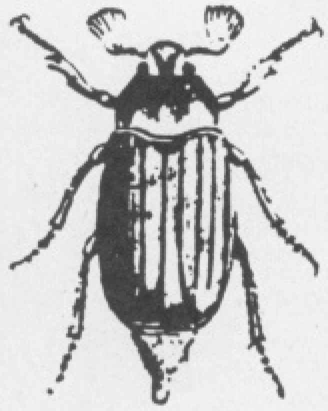


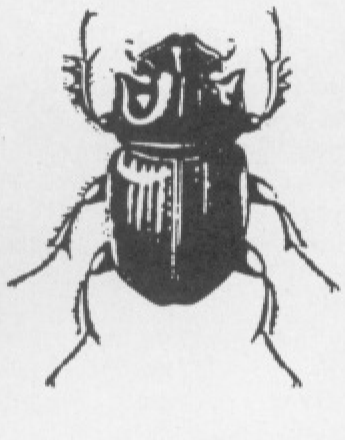





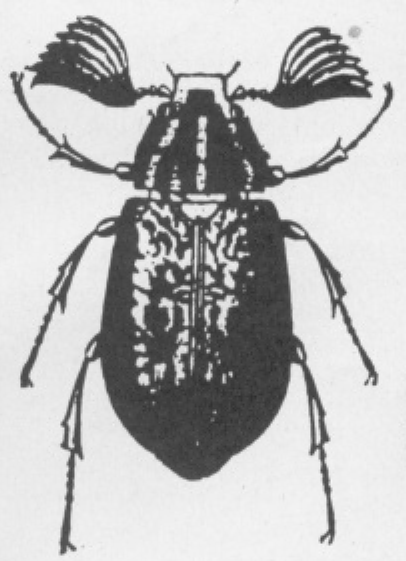
```
830 POKEBO,0:POKEBO+1,0:LI=LI-1:POKEV+21,0:GOTO5
900 POKES1,32:POKES2,10:POKES3,2:POKES1,33:SP=SP+1:POKE49607,SP:POKE49634,SP
910 FORI=G2TOG1STEP-1:POKEI+C,0:NEXT:G3=1984:CO=5:RETURN
999 REM RED GRN RED
1000 A$="█_█♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠♠█‾            ":GA=1:EA=0
1001 KK=479
1001 REM RED
1002 B$="█‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾         "
1003 REM RED
1004 C$="█||||||||||||||||||||||||||||||||         "
1009 REM   4*CRD-CRR-BLU   2*CRR   2*CRR  10*CRR
1010 D$="██████||███||||||||||||███|||||||||||██████████"
1013 REM BLU-CRD CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL-CRR-
1014 REM-CRD-CRL-CRR-CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL CRD
-CRL CRD-CRL CRD-CRL CRD-CRL CRD-CRL
1015 E$="██|██|██|██|██|██|██|███████|██|██|██|██|██|██|██|██|██|██|"
1089 REM HOM
1090 PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":FORT=0TO2:PRINTD$;:NEXT
1091 REM HOM- 15*CRR
1092 PRINT"████████████████"E$
1093 REM GRN CRD-  5*CRL   2*CRD HOM-  2*CRD
1094 X$="█|↘|↘|██████↘|↘|↘██":PRINT"████":PRINTTAB(9)X$:PRINTTAB(22)X$
1094 REM CRD
1095 PRINTTAB(8)X$:PRINT"█":PRINTTAB(16)X$:POKEV+21,15
1098 GOSUB600:POKEV+30,0
1099 RETURN
1999 REM CLR
2000 PRINT"█";:PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:GA=2:LE=2:EA=0
2002 KK=542
2004 REM HOM-  3*CRD GRN   2*CRD
2005 PRINT"█████":PRINTTAB(12)"█||||||":PRINTTAB(20)"███↘|↘|↘|"
2009 REM GRN   2*CRD
2010 PRINTTAB(4)"█||||||":PRINTTAB(16)"███↘|↘|↘|"
2014 REM GRN   2*CRD
2015 PRINTTAB(9)"█||||||":PRINTTAB(23)"███↘|↘|↘|"
2019 REM HOM-  4*CRD-GR1   2*CRD
2020 PRINT"██████":PRINTTAB(17)"||||||":PRINTTAB(22)"███||||||"
2024 REM   4*CRD
2025 PRINTTAB(1)"|||||||||||||":PRINTTAB(15)"█████||||||"
2030 POKEV+21,31:POKEV,100:POKEV+1,100:GOSUB600:POKEV+30,0:RETURN
2999 REM CLR HOM
3000 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=3
3004 REM   2*CRD GRN   2*CRR   2*CRR   2*CRR   2*CRR   2*CRR
3005 PRINT"██":P$="█|███|███↘↘███|███↘↘███||":PRINTTAB(4)P$:KK=541
3009 REM   3*CRD   3*CRD
3010 PRINT"████":PRINTTAB(7)P$:PRINT"████":PRINTTAB(2)P$
3014 REM GR1   7*CRR HOM-  7*CRD
3015 Q$="█|||||||||███████||||||":PRINT"████████":PRINTTAB(2)Q$
3019 REM   5*CRD
3020 PRINT"█████":PRINTTAB(4)Q$
3050 POKEV+30,0:POKEV,100:POKEV+1,100:POKEV+21,63:GOSUB600
3080 GOSUB12000
3099 RETURN
3099 REM CLR HOM
3100 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=4
3108 REM WHT   6*CRR   5*CRR   5*CRR GRN CRD-  2*CRR CRD-  2*CRR CRD-  2*CRR
3109 REM CRD-  2*CRR   3*CRR   3*CRR   3*CRR
3110 Q$="█||██████||██████||██████||":P$="█|████|████|████|████|████|████|████|":KK=585
3114 REM HOM-  3*CRD HOM- 10*CRD
3115 PRINT"█████":PRINTTAB(2)P$:PRINTTAB(3)P$:PRINT"████████████":PRINTTAB(2)Q$
3180 GOSUB12000
3190 POKEV+21,127:POKEV,100:POKEV+1,100:POKEV+30,0:GOSUB600
3199 RETURN
3199 REM CLR HOM
3200 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=5
3209 REM HOM-  6*CRD GRN CRR CRR CRR CRR CRR CRR CRR CRR CRR CRR CRR
3210 PRINT"███████":PRINTTAB(4)"█|██|██|██|██|██|██|██|██|██|██|██|":KK=579
3219 REM   3*CRD WHT   7*CRR   7*CRR   7*CRR
3220 PRINT"████":PRINTTAB(7)"█||███████||███████||███████||"
3229 REM   3*CRD GRN CRR CRR CRR CRR CRR CRR CRR CRR CRR CRR CRR
3230 PRINT"████":PRINTTAB(4)"█|██|██|██|██|██|██|██|██|██|██|██|"
3240 POKEV+21,255:POKEV+1,100:POKEV,100:POKEV+30,0:SP=SP+1:GOSUB600
3260 GOSUB12000
3299 RETURN
3299 REM CLR HOM
3300 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=6
3309 REM HOM-  7*CRD CRR-GR1 GRN GR1
3310 PRINT"███████":P$="█||||||||||||||█↘|↘█||||||||||||":KK=493
3320 FORT=0TO3:PRINTP$:NEXT
3330 POKEV,100:POKEV+1,100:GOSUB12000:POKEV+21,255:GOSUB600
3399 RETURN
3399 REM CLR HOM
3400 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=7
3409 REM HOM-  2*CRD GRN   4*CRD GR1
3410 PRINT"████":PRINTTAB(4)"█|||||":PRINT"█████":PRINTTAB(14)"█|||||":KK=581
3419 REM   4*CRD-GRN
3420 PRINT"██████":PRINTTAB(18)"↘↘↘↘↘":GOSUB12000:POKEV+21,255:SP=SP+1:GOSUB600
3430 POKEV,100:POKEV+1,100:POKEV+30,0:RETURN
3499 REM CLR HOM
3500 PRINT"█":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"█":EA=0:GA=8
```

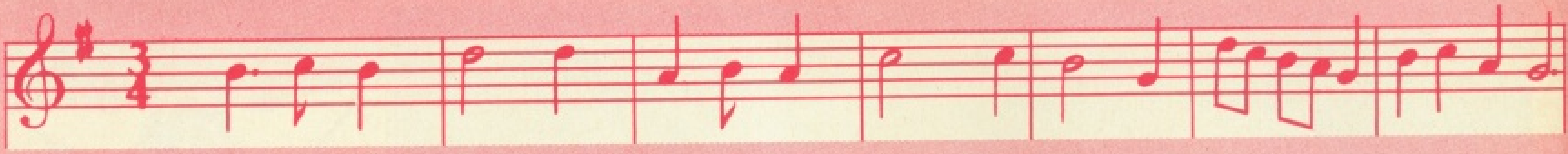
```
3500 REM CRR-GRN   2*CRR-CRD-GR1 CRD-GRN CRD-GR1 CRU-GRN CRU-GR1   2*CRR-CRU-
3509 REM-GRN CRD HOM-  2*CRD
3510 P$="■|||■||||■|||■|■|||■||||■■||||":Q$="■":PRINT"■■";:KK=484
3520 FORT=0TO4:PRINTP$:PRINTQ$:NEXT:GOSUB12000:POKEV+21,255:POKEV,200
3530 GOSUB600:POKEV+1,120:POKEV+30,0:RETURN
3599 REM CLR HOM
3600 PRINT"■":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"■":EA=0:GA=9
3609 REM HOM-  3*CRD GRN   5*CRD GR1   4*CRD
3610 PRINT"■■■":PRINTTAB(15)"■|||":PRINT"■■■■":PRINTTAB(14)"■||||||":PRINT"■■
Q":KK=597
3619 REM GRN
3620 PRINTTAB(24)"■、、、":POKEV+21,255:POKEV,100:POKEV+1,100:POKEV+30,0:RETURN
3699 REM CLR HOM
3700 PRINT"■":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"■":EA=0:GA=10
3709 REM HOM-  4*CRD GRN  10*CRD GR1
3710 PRINT"■■■":PRINTTAB(16)"■|":PRINT"■■■■■■■■":PRINTTAB(16)"■||":KK=606
3720 POKEV+21,255:SP=SP+1:POKEV,100:POKEV+1,100:POKEV+30,0:GOSUB600:GOSUB12000
3730 RETURN
3799 REM CLR HOM
3800 PRINT"■":PRINTB$;:FORT=0TO20:PRINTA$;:NEXT:PRINTC$:PRINT"■":EA=0:GA=11
3809 REM HOM- 11*CRD GRN
3810 PRINT"■■■■■■■■■■■":PRINTTAB(16)"■|":KK=608:GOSUB600:GOSUB12000
3820 POKEV+21,1:SP=SP+1:POKEV,100:POKEV+1,100:POKEV+30,0:RETURN
3998 REM CLR BWN  12*CRR
4000 PRINT"■":U$="■──────────────────────■■■■■■■■■■■■■■":FORT=0TO21:PRINTU$;
4004 REM GRN- 14*CRR  15*CRR
4005 NEXT:V$="■■■■■■■■■■■■■■+++++++++++■■■■■■■■■■■■■■■":GA=12:EA=0
4009 REM HOM-  4*CRD
4010 PRINT"■■■■":FORT=0TO11:PRINTV$;:NEXT:KK=144
4020 V=53248:POKEV+21,255:POKEV+27,254:GOSUB600:GOSUB12000:POKEV+30,0
4030 POKEV+1,100:POKEV,50:RETURN
4099 REM CLR- 10*CRD
4100 PRINT"■■■■■■■■■":POKEV+21,0
4109 REM RED CYN
4110 PRINT"■ CONGRATULTIONS■,YOU HAVE COMPLETED THE  ";
4119 REM WHT YEL PUR WHT
4120 PRINT" ■TASK,YOUR SCORE IS■";S;"■PLEASE ■ENTER    ";
4129 REM CYN GRN CYN RED YEL GR2
4130 PRINT"■ YOUR ■NAME":INPUT"■>■>■>■";NA$
4140 FI=1:LE=1:RETURN
9999 REM CLR-  4*CRD
10000 PRINT"■■■■";:V=53248:POKEV+21,0
10009 REM HOM-  5*CRD
10010 Z$=" GARDEN":ZZ$="CLEARED!!READY FOR GARDEN":PRINT"■■■■■";
10020 FORT=1TO20:PRINTZ$;GA;ZZ$;GA+1:POKE646,INT(RND(1)*15):GOSUB730
10024 NEXT:EA=0:FORT=0TO2000:NEXT:RETURN
10999 REM CLR
11000 POKEV+21,0:PRINT"■"
11004 REM HOM-  8*CRD
11005 FORT=0TO50:PRINT"■■■■■■■■":R=RND(1)*255:PRINTTAB(R)"●GAME OVER●"
11009 REM CLR
11010 POKE646,INT(RND(1)*15):GOSUB740:NEXT:FORT=0TO500:NEXT:PRINT"■"
11015 IFS<HITHENRETURN
11019 REM HOM- 12*CRD
11020 W$=">":W1$="■■■■■■■■■■■■"
11021 FORTT=0TO10:PRINTW1$:FORT=0TO10:PRINTLEFT$(W$,1);:POKE646,INT(RND(1)*15)
11021 REM YEL PUR CYN RED ORN
11022 GOSUB740:NEXTT,TT:INPUT"■N■A■M■E■";NA$
11030 RETURN
12000 GG=255:FORI=3TO15STEP2:POKEV+I,GG:POKEV+I-1,0:GG=GG-31:NEXT:RETURN
59999 REM CLR
60000 PRINT"■":POKE53280,0:POKE53281,0:POKE53272,29:IFS>HITHENHI=S
60005 FI=0
60014 REM LRD
60015 PRINT"■      \/     \||||/ |||||/ \/  \/
60020 PRINT"      ||      |||||| |||||| ||  ||
60025 PRINT"      ||      |||♥|| |||♥|| ||_●||
60030 PRINT"      ||      ||  || ||  || ||||||
60040 PRINT"      ||      |||||| ||  || ┌||||┐
60045 PRINT"      ||_     |||||| ||  ||  ♥|||
60050 PRINT"      |||||/ |||♥|| ||||||    ||
60055 PRINT"      ┌||||┐┌┐ ┌┐||||┐   ┌┐
60064 REM   2*CRD-GRN
60065 PRINT"■■        |||||/ \/  \/ \|||||/
60070 PRINT"          |||♥|| ||  || |||||||
60075 PRINT"          ||  || ||  || ||  ♥||
60080 PRINT"          |||||┐ ||  || ||
60085 PRINT"          |||||/ ||  || ||  ||||
60090 PRINT"          |||♥|| ||  || ||  ♥|||
60095 PRINT"          ||  || |||||| |||||||
60100 PRINT"          |||||┐┌||||┐┌||||┐
60109 REM CRD RED PUR GRN BLU YEL RED CYN PUR GRN BLU YEL
60110 PRINT"■    ■BY ■F ■G ■T■D■U■T  ■/// ■SPACE ■TO ■PLAY
60114 REM CRD WHT RED CYN PUR GRN BLU YEL RED CYN YEL PUR BLU YEL
60115 PRINT"■";NA$;",S ■H■I■G■H ■S■C■O■R■E■ ■I■S■";HI
60200 GETX$:IFX$=""THEN60200
60249 REM CLR
60250 IFX$=" "THENPRINT"■":DD=0:RETURN
60300 GOTO60200
READY.
```
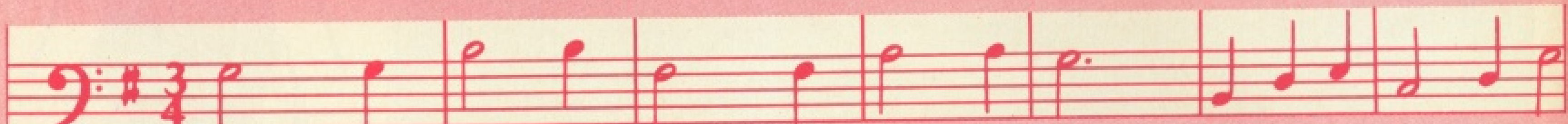










THE WELL-TEMPERED 64



Phil South has many strings to his bow. This month he fiddles about with music programming in BASIC, note values and duration and music software.

```
10 REM ***FREKK BY FLIPPO***
20 PRINT : PRINT : PRINT : PRINT
30 INPUT "FREQUENCY ";FQ
40 PRINT : PRINT
50 F = INT(FQ/0.05961)
60 HF = F/256
70 PRINT "HF IS ";HF
80 H = INT(HF)
90 L = HF-H
100 PRINT "THE DECIMAL PART IS 0";L
110 LF = L*256
120 PRINT "HF = ";H
130 PRINT "LF = ";LF
```

The duration and pitch of notes in a piece of music are what makes it pleasing to the ear. Catchy rhythmns and use of pleasant notes and combinations are what makes the difference between a best selling game (witness Ghostbusters) and an annoying noise that the user can't wait to toggle off!

In music, there are many different lengths of note. You probably recall them from your school days; they have weird names like semibreve, minim, crotchet and hemidemisemiquaver. Well, for the sake of simplicity (and a certain pseudo-American modern quality) we'll adopt the usual American equivalents.

Semibreve = whole note = 4 beats
Minim = 1/2 note = 2 beats
Crotchet 1/4 note = 1 beat
Quaver = 1/8 note = 1/2 beat
Semiquaver = 1/16 note 1/4 beat

We won't bother with the hemisemi – or hemisemidemiquaver varieties, because they not only occur too infrequently to bother with, but this is complicated enough without them!

The duration values are as follows:

whole note = 1000
1/2 note = 500
1/4 note = 250
1/8 note = 125
1/16 note = 62.5

In musical notation, when a note is dotted, (a dot marked on the score just after the note) its length is increased by half. This is easy to do to our computerised notes, by simply adding half as much again:

1) 1/2 note duration = 500
2) Half it = 250
3) Add it to first value making it dotted note = 750

This means that we can add expression to a piece by trial and error, adding and subtracting duration values or sections to achieve the rhythm of our choice.

Now you've struck ze right note!

Now, the only thing missing from your knowledge about the SID chip is note values: which values to poke and where to get which pitch.

Sound, as I mentioned last month, is a series of waves, commonly regarded to resemble those made by throwing a stone into a pond, except that sound moves not in concentric circles, but in concentric spheres.

Different sounds can be measured in terms of 'frequency': how many waves per second passing a fixed point in space or how many 'cycles per second'. The scientific word for cycles per second is Hertz (Hz), named after German scientist and father of wireless telegraphy, Heinrich Hertz (1857-94). The distance between the successive peaks of the waves is measured against time: the interval it takes between one wave passing the spot and the next one. If this is X seconds, then the frequency of the wave is (1/X).

This is all well and good, and makes me look like a physics whizz, but what do you actually do?

Well, in order to make a noise from the computer, you must POKE two numbers into it: the High Frequency (HF) and the Low Frequency (LF) values. In order to find HF and LF from the frequency of your note, use the following equations. For example, the pitch for the note of A over middle C is 440Hz. To split this into the HF and LF we must type in listing 1.

This program breaks the frequencies down into units usable to the SID; for instance, 440Hz gives a result of HF =17, LF=38, which according to the Commodore 64 manual is spot on. See the following table.



Note/Octave	HF	LF	Note/Octave	HF	LF
C 1	1	18	C 4	17	37
C # 0	1	35	C # 4	18	42
D 1	1	52	D 4	19	63
D # 0	1	70	D # 4	20	100
E 0	1	90	E 4	21	154
F 0	1	110	F 4	22	227
F # 0	1	132	F # 4	24	63
G 0	1	151	G 4	25	177
G # 0	1	179	G # 4	27	56
A 0	1	205	A 4	28	214
A # 0	1	233	A # 4	30	141
B 0	2	6	B 4	32	94
C 1	2	37	C 5	34	75
C # 1	2	69	C # 5	36	85
D 1	2	104	D 5	38	126
D # 1	2	140	D # 5	40	200
E 1	2	179	E 5	43	52
F 1	2	220	F 5	45	198
F # 1	3	8	F # 5	48	127
G 1	3	54	G 5	51	97
G # 1	3	103	G # 5	54	111
A 1	3	155	A 5	57	172
A # 1	3	210	A # 5	61	126
B 1	4	12	B 5	64	188
C 2	4	73	C 6	68	149
C # 2	4	139	C # 6	72	169
D 2	4	208	D 6	76	252
D # 2	5	25	D # 6	81	161
E 2	5	103	E 6	86	105
F 2	5	185	F 6	91	140
F # 2	6	16	F # 6	86	254
G 2	6	108	G 6	102	194
G # 2	6	206	G # 6	108	223
A 2	7	53	A 6	115	88
A # 2	7	163	A # 6	122	52
B 2	8	23	B 6	129	120
C 3	8	147	C 7	137	43
C # 3	9	21	C # 7	145	83
D 3	9	159	D 7	153	247
D# 3	10	60	D # 7	163	31
E 3	10	205	E 7	172	210
F 3	11	114	F 7	183	25
F # 3	12	32	F # 7	193	252
G 3	12	216	G 7	205	133
G # 3	13	156	G # 7	217	189
A 3	14	107	A 7	230	176
A # 3	15	70	A # 7	244	103
B 3	16	47			

Soft options

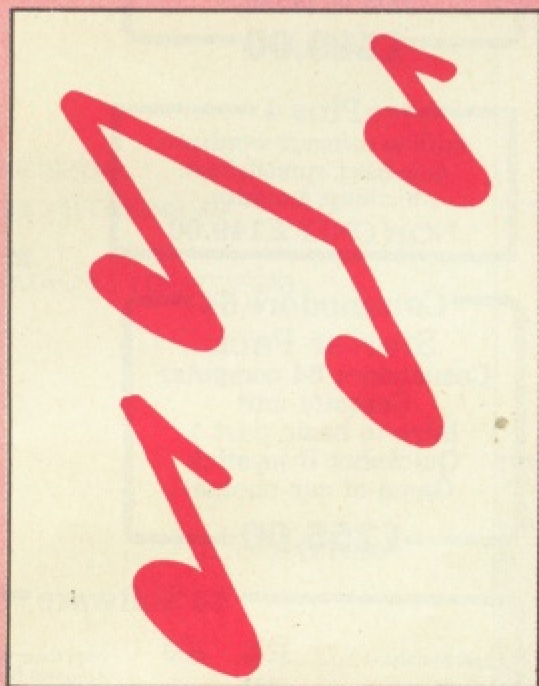
There are a number of pieces of software available that allow the user to benefit from the marvels of the SID chip, without having to program it all in yourself. The first of these is Music Maker (Commodore); this is the one with a plastic overlay keyboard, and it effectively turns your 64 into a sophisticated Casiotone. You have options to sequence the keys, play mono or polyphonically, and change the sounds of the synth with single keystrokes. Not a bad little package, but a trifle limiting in the end. Good for people who are used to a musical keyboard!

Synth-64 (Abacus/Adamsoft) is less of a performance synth or sequencer, but more of a programmer's aid. It lets you write music using merely the note letters: A#, C, D etc. This is all very nice, but it is a bit complicated, and as such you'd be better off programming in BASIC!

Music Composer (Electronic Arts) is exactly that; a first class music composer, allowing you to compose music on a stave. When you've done it though, you can't print out the results and you can't change the sound of the voices. A bit of an enigma, this one.

Multisound Synthesiser (Romik) is a super performance synth/sequencer, featuring amongst other things, a real-time play that you don't get with other computer synthesisers.

But none of these are nearly as comprehensive and user friendly as Music Master (Supersoft) which is easy to use, well laid out and well documented.



What's on next month

Interrupts are machine code routines which give an impression of movement and sound happening simultaneously. I'll be explaining all about them, and giving more detail about synthesis.

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If you never believed mental arithmetic could be a painless process, try this Commodore 64 game from Christopher Hossack.

GRID CRIB

TWO 9x9 GRIDS ARE PROVIDED, one for the player and one for the computer. The object of the game is to find all five different chains made up of five coloured blocks in your grid, before the computer completes its grid.

The computer will ask you a mathematical question. If you answer correctly, you must pick a square.

If the square is yellow, your turn ends. If it's any other colour, you must select another square. The computer selects squares until it picks a yellow one, after which the player has another turn.

The colours and the questions are selected randomly so no two games are the same.

Program Listing

```
1 REM CRD
2 POKE53280,2:POKE53281,0:CH$="▣WRONG ITS "
10 S1=10:S2=10
99 REM CLR
100 DIM G(15,15,2):PRINT"▣"
200 REM**FILL IN GRID**
210 FORX=1TO2
220 FORY=1TO5
240 A=INT(7*RND(1))+1
250 B=INT(7*RND(1))+1
260 IFG(A,B,X)<>0THEN 240
270 G(A,B,X)=Y:FORT=1TO4
280 A1=INT(2*RND(1)):IFA+A1>9THEN280
290 F3=0:B1=INT(2*RND(1)):IFB+B1>9THEN290
300 PRINTA,B:IFV=20THENRUN
305 IFG((A+A1),(B+B1),X)<>0THENV=V+1:GOTO280
310 A=A+A1:B=B+B1:G(A,B,X)=Y
320 V=0:NEXTT
330 NEXTY
340 NEXT X
400 REM***DISPLAY CHART***
409 REM CLR
410 PRINT"▣        PLAYER                    COMPUTER"
419 REM WHT
420 PRINT"▣";:FORX=1TO9
429 REM ORN WHT ORN WHT
430 PRINTX"▣┌┬┬┬┬┬┬┬┬▣"TAB(26)X"▣┬┬┬┬┬┬┬┬┐▣"
440 NEXTX
449 REM ORN ORN
450 PRINT"▣      ─────────"TAB(29)"▣─────────  "
459 REM ORN
460 PRINT"▣     1 3 5 7 9"TAB(29)"1 3 5 7 9 "
469 REM PUR
```

```
470 PRINT"      2 4 6 8 "TAB(29)" 2 4 6 8 ■"
480 READA,B,C:IFA=-1THEN490
485 POKEA,B:POKEA+54272,C:GOTO480
489 REM CYN
490 FORX=1TO11:PRINT"":NEXTX:PRINT"▶ SCORE:                                    SCORE: ";
490 REM   2*CRU
491 FORX=1TO11:PRINT"□□":NEXTX
492 GOSUB4000:GOSUB4100
500 Q$="":REM**MAKE UP QUESTION***
510 A=INT(13*RND(1)):B=INT(13*RND(1)):C=A*B
519 REM CRU
520 PRINTTAB(16)"                 □":PRINT"PLAYER1,WHAT IS"A"X"B"?"
525 GET JUNK$:IFJUNK$<>""THEN525
530 PRINT"YOU HAVE 10 SECONDS":TI$="000000"
540 PRINT"TIME "RIGHT$(TI$,2);
549 REM   2*CRL
550 GET A$:PRINT"■■"RIGHT$(TI$,2);
554 V8=2
554 REM CRD
555 IFTI$>"000010"THENPRINT"■OUT OF TIME":GOSUB8000:FORX=1TO500:NEXTX:GOTO1000
560 IF A$=""THEN550
570 IF A$=CHR$(148)THENZ=LEN(Q$):Q$=LEFT$(Q$,Z-1):GOTO550
580 Q$=Q$+A$
585 IFLEN(Q$)>3THENQ$=""
590 IFVAL(Q$)=CTHEN610
595 IF LEN(Q$)=LEN(STR$(C))THENPRINTCH$;C:GOSUB8000:FORX=1TO500:NEXTX:GOTO1000
600 GOTO550
609 REM CRD
610 PRINT"■IT IS CORRECT":V8=255:GOSUB8000:FORX=1TO500:NEXTX
619 REM   4*CRU
620 PRINT"□□□□"
630 PRINT"                                                  "
640 PRINT"                                                  "
649 REM   3*CRU
650 PRINT"                                                  □□□"
659 REM CRU CRU
660 PRINT"□                                        ":PRINT"□GRID REF (X-Y)";:A$="":B9=0
661 GET JUNK$:IFJUNK$<>""THEN661
662 GETZ$:IFZ$=""THENGOTO662
663 A$=A$+Z$:PRINTZ$;:IFLEN(A$)=3THENGOTO668
664 IFLEN(A$)=2ANDRIGHT$(A$,1)>"0"THENB9=1
665 IF RIGHT$(A$,1)<="9"ANDB9=1THEN GOTO668
666 GOTO661
667 REM CRD
668 PRINT"■"
669 IFLEN(A$)=1THENX=-5:GOTO681
670 X=VAL(LEFT$(A$,1))
680 Y=VAL(RIGHT$(A$,1))
680 REM CRU
681 IFX<1ORX>9THENPRINT"□";:GOTO660
681 REM CRU
682 IFY<1ORY>9THENPRINT"□";:GOTO660
690 X1=1024+(X+3)+40*Y
700 IFG(X,Y,1)>9THEN710
701 IFG(X,Y,1)=0THENG(X,Y,1)=7
702 POKEX1,224:POKEX1+54272,G(X,Y,1)
704 IF G(X,Y,1)=7THENG(X,Y,1)=0
706 S2=S2+G(X,Y,1):G(X,Y,1)=G(X,Y,1)*10
707 GOSUB6000:GOSUB4000
710 V8=255
710 REM CRU CRU
711 IFG(X,Y,1)<>0THEN PRINT"□                                    ":PRINT"□";:GOSUB8000:GOTO660
715 V8=2:GOSUB8000
```

Program Listing

```
719 REM CRU CRU
720 PRINT"□                              ":PRINT"□";:PRINT"MY TURN!":FORX=1TO500:NEXTX
800 GOTO2000
999 REM   3*CRU
1000 PRINT"□□□"
1010 PRINT"                              "
1020 PRINT"                              "
1029 REM   3*CRU
1030 PRINT"                              □□□"
2000 REM***COMPUTER GUESS**
2010 IFK9=1THEN2060
2020 H=INT(9*RND(1))+1:J=INT(9*RND(1))+1:IFG(H,J,0)=6THEN2020
2030 X1=1024+(H+28)+40*J
2040 POKEX1,224
2041 IFG(H,J,2)=0THENG(H,J,2)=7
2042 IF G(H,J,2)>9THEN POKEX1+54272,(G(H,J,2)/10):GOTO2045
2043 POKEX1+54272,G(H,J,2)
2044 IFG(H,J,2)=7THENG(H,J,2)=0
2045 G(H,J,0)=G(H,J,2):IFG(H,J,0)=0THENG(H,J,0)=6
2046 IFG(H,J,2)>9THEN2050
2047 IF G(H,J,2)=0THEN V8=2:GOSUB8000:GOTO2049
2048 V8=255:GOSUB8000
2049 S1=S1+G(H,J,2):G(H,J,2)=G(H,J,2)*10:GOSUB7000:GOSUB4100
2049 REM CRU   2*CRU
2050 IF G(H,J,2)=0THEN PRINT"□                    □□":GOTO500
2060 K9=1
2070 N=INT(4*RND(1))-1:IFN+H>9ORH+N<1THEN2070
2080 M=INT(4*RND(1))-1:IFM+J>9ORJ+M<1THEN2080
2090 IFG(H+N,J+M,0)=6THENV=V+1:IFV=26THENV=1:K9=0:GOTO2000
2100 IFG(H+N,J+M,0)=6THEN2070
2110 H=H+N:J=J+M:GOTO2030
4000 S$=STR$(S2)
4010 POKE1991,VAL(LEFT$(S$,2))+48:POKE56263,1
4020 POKE1992,VAL(RIGHT$(S$,1))+48:POKE56264,1
4030 S2=VAL(S$)
4040 RETURN
4100 S$=STR$(S1)
4110 POKE2018,VAL(LEFT$(S$,2))+48:POKE56290,1
4120 POKE2019,VAL(RIGHT$(S$,1))+48:POKE56291,1
4130 S1=VAL(S$)
4140 RETURN
6000 IFS2=85THEN PRINT"DRAT!!!      YOU HAVE WON":GOSUB4000:GOTO9900
6010 RETURN
7000 IFS1=85THENPRINT"HAH! YOU HUMANS ARE DUM!":GOSUB4100:GOTO9900
7010 RETURN
8000 S9=54272:FORL9=0TO24:POKES9+L9,0:NEXTL9
8010 POKES9+1,V8:POKES9+5,9:POKES9+15,1:POKES9+24,15
8020 POKES9+4,21:FORT=1TO1000:NEXT:POKES9+4,20
8030 RETURN
9000 DATA1080,224,1,1082,49,1
9010 DATA 1084,16,1,1085,15,1,1086,9,1,1087,14,1,1088,20,1
9020 DATA 1160,224,2,1162,50,8
9030 DATA 1164,16,8,1165,15,8,1166,9,8,1167,14,8,1168,20,8,1169,19,8
9040 DATA 1240,224,3,1242,51,3
9050 DATA 1244,16,3,1245,15,3,1246,9,3,1247,14,3,1248,20,3,1249,19,3
9060 DATA 1320,224,4,1322,52,4
9070 DATA 1324,16,4,1325,15,4,1326,9,4,1327,14,4,1328,20,4,1329,19,4
9080 DATA 1400,224,5,1402,53,5
9090 DATA 1404,16,5,1405,15,5,1406,9,5,1407,14,5,1408,20,5,1409,19,5
9900 INPUT"DO YOU WANT ANOTHER GAME (Y/N)";Q$
9910 IF Q$="N"THENSYS64738
9920 RUN
10000 DATA -1,-1,-1
READY.
```

Mike Hart offers a few tips and routines to help you produce clearer code.

Reliable Routines

HAVE YOU EVER HAD THE feeling that the program that you so carefully produced and then listed is now unintelligible? This is often due to the fact that none of the loops are indented as they are, automatically, in some more advanced BASICs, and that there are a lot of GOTO and GOSUB anonymous line numbers and the like. If just a little time and trouble are taken with your longer programs then it will really pay dividends when you come to amend or adapt them later on.

Indenting lines

One useful facility is the ability to indent lines by a couple of spaces to indicate the contents of a FOR-NEXT loop. If you try to put spaces in then normally the interpreter will remove them when listing the program and your efforts will have been in vain. However, try either of these 'tips':

(1) Put a colon after each line number. Now any spaces that you put after the colon will be retained so you can indent as much as you like, but the responsibility for how much and when you indent is yours. This method also has the advantage that you can enter spare line numbers (complete with colons) to separate portions of code which makes it all more readable. Although this consumes a little more space, you will find it worthwhile.

(2) Try putting a graphics character immediately after the line number. Probably the easiest is the diamond (◊) which is immediately next to the SHIFT key and which is generated by SHIFT+Z. On listing, you will find the graphics character does not show but your indentations remain. If you edit the line you will have to remember to re-insert the graphics character immediately after the line number as well.

```
NEATER LISTINGS

1 :REM NEATER LISTINGS DEMO
2 :REM    BY MIKE HART
3 :
10 :FOR J=1 TO 10
20 :    PRINT J,J*J,SQR(J)
30 :NEXT
40 :
50 :GOSUB 100 'SUBROUTINE:PRINT"BACK!"
60 :
70 :END
80 :
90 :
100 :REM SUBROUTINE
110 :PRINT"HELLO...GOODBYE":RETURN
120 :
60000 REM BASIC REVERSE REMS
60010 :
60020 S=PEEK(43)+PEEK(44)*256+4:E=PEEK(45)+PEEK(46)*256
60030 FOR J=S TO E:IF PEEK(J)=143 THEN POKE J+1,18
60040 IF PEEK(J)=0 THEN J=J+4
60050 NEXT:END
60060 :
61000 REM MACHINE CODE REVERSE REMS
61010 :
61020 FOR J=828 TO 882:READ A
61030 POKE J,A:C=C+A:NEXT
61040 IF C<>7494 THEN PRINT "ERROR!"
61050 :
61060 REM SYS 828 TO ACTIVATE
61070 REM CHANGE LINE 61230,BYTE 5
61080 REM FROM 18 TO 32 TO REMOVE!
61090 :
61200 DATA 165,44,133,89,169,5,133,88
61210 DATA 160,0,177,88,240,19,201,143
61220 DATA 240,8,230,88,208,242,230,89
61230 DATA 200,238,200,169,18,145,88,208
61240 DATA 241,200,177,88,200,17,88,240
61250 DATA 13,24,169,5,101,88,133,88
61260 DATA 144,214,230,89,176,210,96
READY.
```

Labelling line numbers

Another trick that some users have not yet discovered is the following. The interpreter within the Commodore machines, when faced with a line number following a GOTO or a GOSUB, will evaluate it as far as the first non-numeric character but does not then generate a syntax error if it meets text immediately after the line number. Therefore a statement such as:

10 GOSUB 1000 'ROUNDING ROUTINE

is not illegal and will work without generating an error. Whether this makes it a 'legal' construction is a nice point! Knowing this means that the programmer can now label all of those anonymous line numbers with a function. Of course you can do this already with a colon and a REM statement but this has the disadvantage that you cannot put another statement on the same line as everything after the REM token is disregarded by the interpreter. If you follow this approach then you can label line numbers and still put other statements on the same line. However, it is your responsibility to ensure that the name you attach as a label and the name that you append to the subroutine have to match up with each other.

Reverse REMS

Finally, here are some routines that will go through your entire program and will print out your REM statements in reverse. When you look at a program which is properly REMmed you can then immediately pick out the important parts of the code and follow the construction process.

Lines 60000-60060 are a BASIC version. Append these lines to your program and then RUN 60000. The program will take about 10 seconds for every 1K of program resident in memory. When you list the result you will see that every statement following the REM token appears in reverse. Then delete the subroutine from lines 60000-60060.

Lines 61000-61260 are a machine-code version of the above complete with disassembly. This is read into the cassette buffer and then activated with a SYS 828 although any other (safe) location will do. To remove REMS then replace the reverse token (18 in line 61230) with a space (32 decimal). This will obviously alter the checksum as well by an appropriate amount.

Conclusion

By combining these tips, it is surprising how easy it is to turn lines of 'spaghetti-like' code into something readable and comprehensible. You probably want your programs not only to be efficient but capable of easy maintenance if you wish to reconstruct the logic of the program and make improvements. These programs work equally well on a C64 or a VIC and have been tested out on both machines.

```
REVERSE REMS
DISASSEMBLY

READY.
B*VERSE REMS DISASSEMBLY
.;0008 30 4F 4F 00 F6
.
033C A5 2C      LDA $2C
033E 85 59      STA $59
0340 A9 05      LDA #$05
0342 85 58      STA $58
0344 A0 00      LDY #$00
0346 B1 58      LDA ($58),Y
0348 F0 13      BEQ $035D
034A C9 8F      CMP #$8F
034C F0 08      BEQ $0356
034E E6 58      INC $58
0350 D0 F2      BNE $0344
0352 E6 59      INC $59
0354 D0 EE      BNE $0344
0356 C8         INY
0357 A9 12      LDA #$12
0359 91 58      STA ($58),Y
035B D0 F1      BNE $034E
035D C8         INY
035E B1 58      LDA ($58),Y
0360 C8         INY
0361 11 58      ORA ($58),Y
0363 F0 0D      BEQ $0372
0365 18         CLC
0366 A9 05      LDA #$05
0368 65 58      ADC $58
036A 85 58      STA $58
036C 90 D6      BCC $0344
036E E6 59      INC $59
0370 B0 D2      BCS $0344
0372 60         RTS
```

Sixteen Up

At last, a number of the leading software houses have noticed the C16. Phil Bonner assesses what they have to offer.

IF YOU BOUGHT A COMMODORE 16 last Christmas you were one of many, and you may now be feeling rather disappointed at the small quantity of good software that has so far appeared. If so, cheer up! Large numbers of games are beginning to hit the market and, although many of them are rewritten from other machines, they are none the worse for that. I have taken a good look at a number of the first offerings from the independent software houses and, although some are poor, several others are well worth buying. For convenience, I have grouped them in categories.

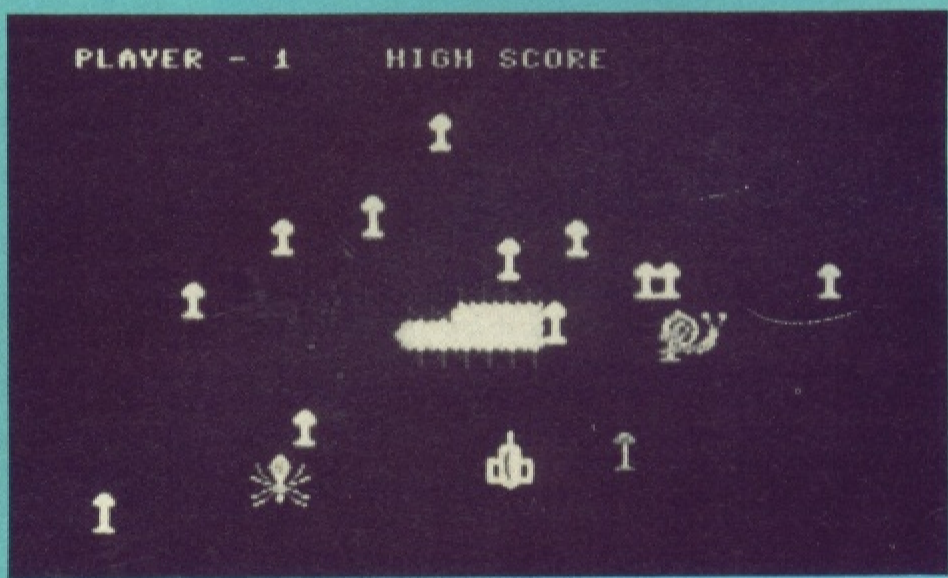


Xargon Wars

Shoot-em-up games

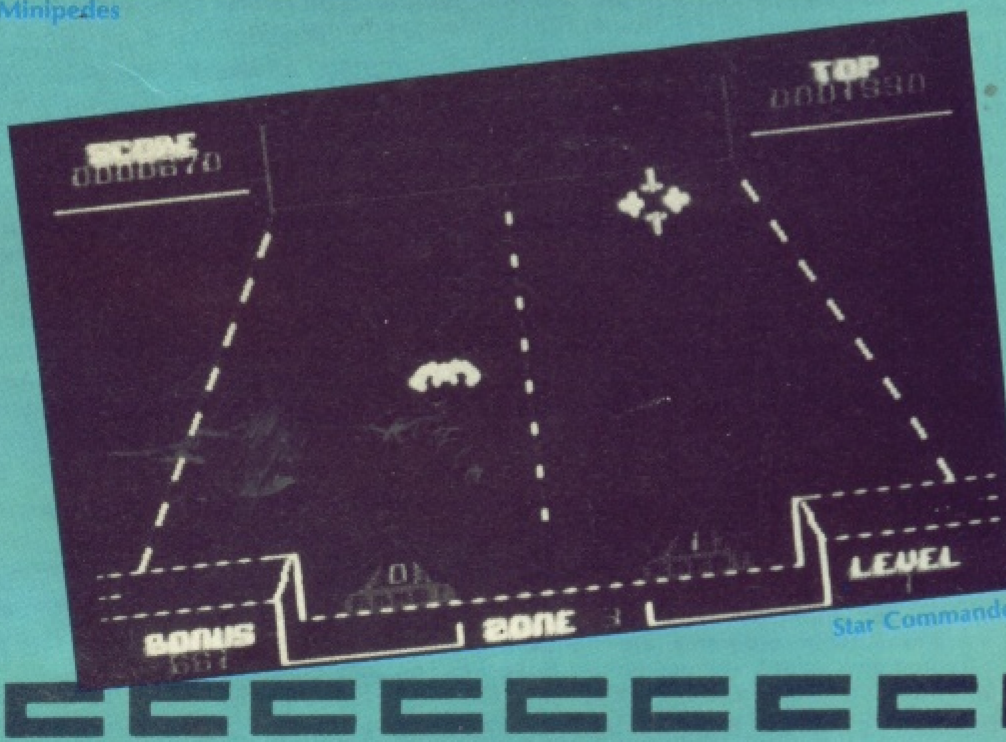
Everybody wants to own at least one game based on Space Invaders, and **Xargon Wars**, from Gremlin Graphics, is an excellent example of its type. Nothing about the game is original, yet it is colourful, challenging and addictive.

You shoot from the ground at wave after wave of aliens — sixteen types in all — which are intent on bombing you out of existence. The aliens move in a variety of flight patterns, so a different strategy is needed for each screen, and they take forms which range from meteorites to giant birds. The chief difficulty lies in avoiding their bombs, which rain down fast and furious — lightning reactions are necessary! Xargon Wars is written in machine code and shows just what can be achieved within 16K of memory. It sets a very high standard for other authors to emulate.

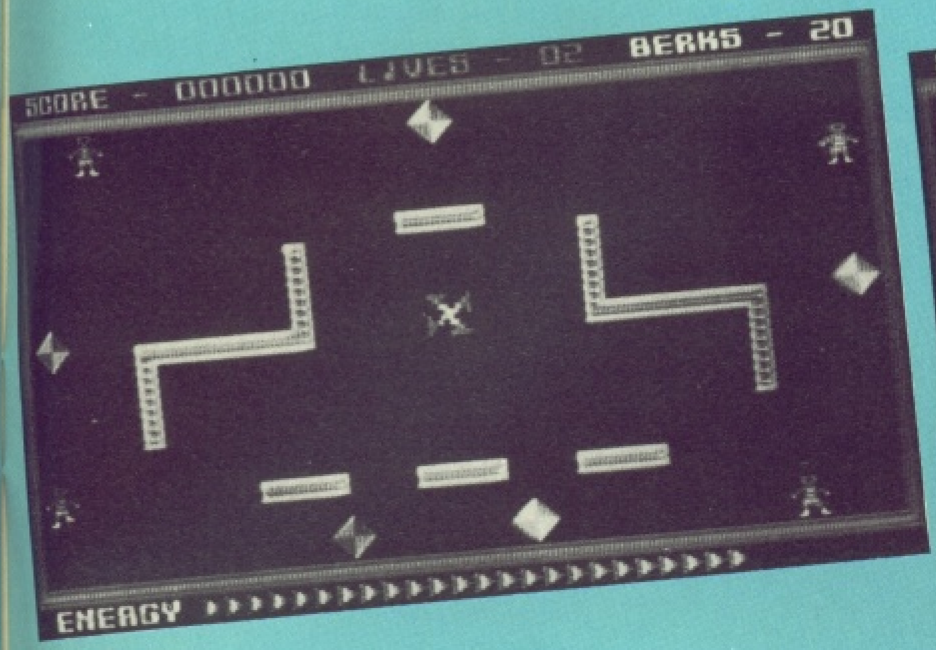


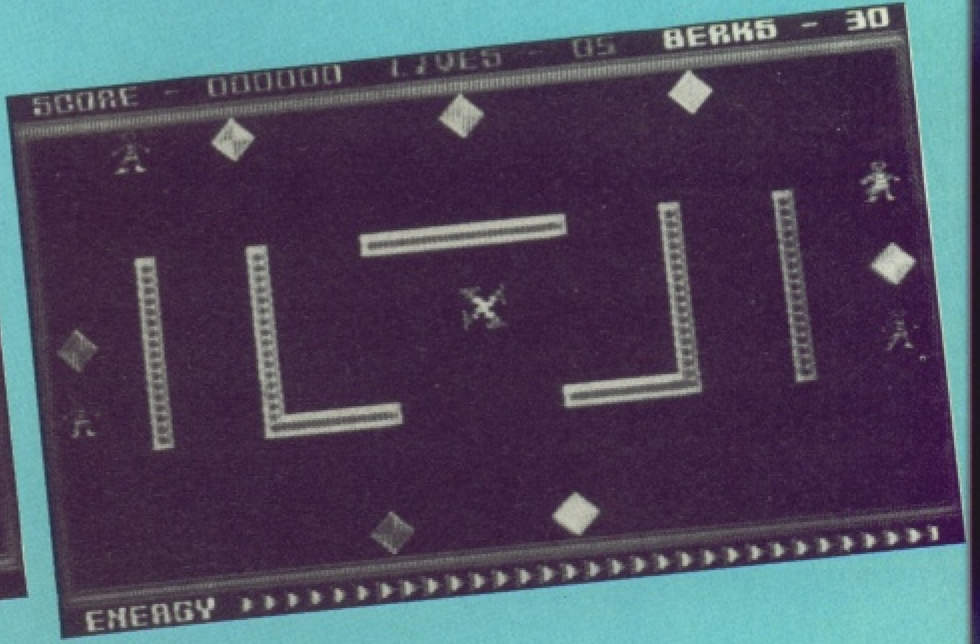
Minipedes

Tynesoft's **Zap-Em** is in some ways similar, but now you are also able to move vertically, up to about a third of the way up the screen. For some peculiar reason the aliens are attacking in helicopters, though later waves change to cubes and flying saucers. Some of them drop bombs, which look like letter Z's though the main problem lies in avoiding the aliens themselves, as they meander gently from right to left, gradually getting lower as they proceed. Rather sneakily, some of them have been made invulnerable, so you have to dodge them and not rely solely on your firepower. The game is well conceived, but suffers slightly from a lack of variety. It is also infuriating that you can only fire one shot at a time, but nevertheless it is fast and quite addictive.



Star Commander





Berks

At £4.99, Microdeal's **Arena 3000** is quite a bit cheaper than most of the other games reviewed. Your task is unashamedly to slaughter everything in sight, after which you start again on a new screen. There are eight different types of opponent, each which has, its own pattern of movement, so you must work out which types must be killed first because they present the greatest danger. Some home in on you with deadly accuracy, some need more than one hit, whilst others are really sneaky — they don't die at once but mutate into different creatures!

It is a difficult game, but if it gets too awkward you can employ an assistant to do the firing whilst you steer, using two joysticks. There is not much variety in the game, but it is well programmed, its fast loader is excellent and it represents good value for money.

First impressions of Anirog's **Star Commander** are not favourable, but once you get into the game you find there is much more to it than meets the eye. You are in a three dimensional shooting gallery, with spaceship targets swooping erratically towards you. They are difficult to hit because of their unpredictable motion, but you must beware of wasting ammunition as you have only eighteen shots available. These are not replenished until you reach screen three, so every shot must count. After the first screen, various hazards appear, including Target Abductors, which limit your scoring, and a particularly evil beast called an Ammunition Raider, which, not surprisingly, raids your stock of ammunition.

The game certainly grows on you, and is really not bad at all. It is a refreshing change from the usual 'fire as fast as you can' games, and I found it very enjoyable.

By no means original is **3D Time Trek**, also from Anirog. All the usual features of Star Trek games are here, although the Klingons, the USS Enterprise and Captain Kirk are not mentioned by name. It is a mixture of a strategy game and arcade game, where you have to search the galaxy — in this case an 8 x 8 grid — and destroy any aliens you find. Your energy is limited, so you need to find a friendly planet from time to time to recharge, and to repair any battle damage. The ship is fully equipped with navigational and battle computers, and has long-range sensors to detect any enemy presence.

The graphics are quite good, without being 'superb', as described in the cassette insert, but the game has a distressing habit of failing to respond unless keys are pressed repeatedly, and on several occasions the program 'hung' completely, so that I had to switch off and start again. These faults should really have been put right before the game was marketed. A shame, as it is otherwise very good.

Anirog's **Minipedes**, on the other hand, is beautifully programmed but incredibly difficult! For those not acquainted with games of the 'Centipede' type, let me tell you that you are in a garden infested with insects, in which, not surprisingly, nothing but mushrooms will grow. You have got so fed up with the situation that you have taken the rather drastic step of going out to shoot all the insects — in particular a rather nasty multi-segmented thing called a minipede. Unfortunately, each segment has to be shot separately if you are to kill the brute. Meanwhile the other insects are attacking in droves — or should it be swarms? — and they are very hard to avoid.

The graphics and colour are good, and the sound excellent. There are fifteen different screens, each more difficult than the last, and I confess I failed to get past screen two! For those of you with lightning reactions, this game would be unbeatable. For me it was just too hard!

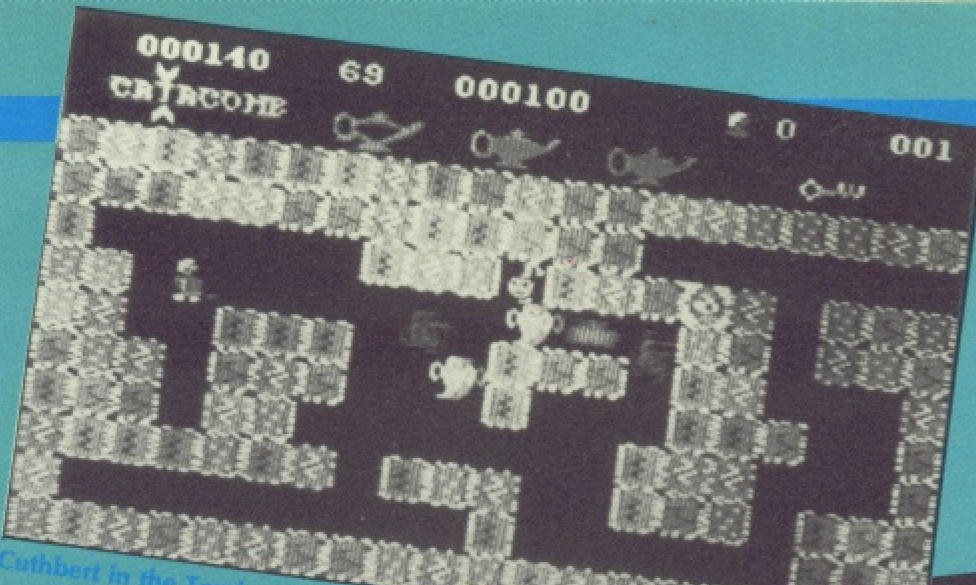
Dodging games

In this section I have included CRL's **Berks**, although it involves a good deal of shooting as well as dodging. This was my favourite of all the games reviewed, but what a silly title! Perhaps the author, Jon Williams, lives in that county to the west of London!?

It turns out that Berks are strange little men, who wander aimlessly around the screen whilst you, vicious brute that you are, do your best to wipe them out. They are protected, however, by Drones, which are diamond-shaped and home in on you unerringly. The drones cannot be killed, but only paralysed for a few seconds. Each screen — of which there are no fewer than 32 — contains a variety of obstacles. If you bump into one of these, or into the perimeter wall, you lose control for a while, and then the drones can get you. So your task is to shoot the berks while dodging the drones and avoiding the obstacles — easy, really! The game is fast, colourful, original and completely compelling. You should buy it as soon as possible.

In complete contrast is **Lunar Docking** from Tynesoft. The aim of the game is to collect six fuel pods from a Planet's surface and, dodging asteroids and satellites, to take them to the six open ports of a large mother-ship orbiting above. At this stage, the spaceship blasts off and you start again on a faster level. At least, that is what is supposed to happen, but the program has a bug, which kills you every time you successfully dock a fuel pod! The game is written mainly in BASIC, with some machine code routines, and by altering the BASIC part I was able to get it to run. It proved quite reasonable, but should never have been released as it stands. Quite unforgivable!

Microdeal have taken a similar idea in their **Cuthbert In Space**, but they have turned it into a marvellously entertaining game, which is varied and calls for real skill, yet is easy on the lower levels. Your mother-ship lands on a succession of strangely named planets, where you have to first refuel, then collect as much loot as possible, while avoiding or shooting the



Cuthbert in the Tombs of Doom



Flight Path 737

nasties which cartwheel across the screen in both directions. After the looting stage you take off for another planet, but further dangers lurk en route, because your ship sometimes turns out to be booby-trapped. If this happens you need to go for spares, then return to the mother-ships's coordinates before the time allowed expires. During this phase, the joystick responds unpredictably, adding to the challenge.

It is an excellent game, with superb graphics and sound, and it includes a high-score table, unlike many of the other games.

Anirog's **Petch** is another beautiful little game, in which you play the title role — a member of that endangered species, the Pink Penguins! Your task is to protect your hoard of diamonds by crushing wicked Arctic monsters between ice cubes. As with all the Anirog games, the tape is a fast-loader, but this one contains versions fòr the Commodore 64 and the Vic 20 as well as the C16. The C16 game lacks some of the facilities of the 64 version, but is really very similar and great fun to play. Large bonuses are available for killing the monsters quickly and for lining up your diamonds in a row. The sound and graphics are excellent, with beautiful animation; you should certainly add this one to your collection.

Simulations

With the exception of 'Zap-em', the Tynesoft games I have seen are of poor quality, and **Olympiad** is no better than the rest. It is an attempt to cash in on the success of games such as Decathlon, but it completely fails to provide any interest or excitement. There are four field events and four track events, in each of which you must pound vigorously at the X and Z keys to increase speed. In the field events you then press the space-bar to release your shot, javelin or whatever. The graphics are poor, and the long-jump and javelin events contain a bug which makes it impossible to succeed. Most disappointing!

Flight Path 737 is Anirog's C16 version of their successful flight simulation game for the 64 and the VIC. The aim is to take off safely, clear a range of mountains and land at a runway on the other side. You control your speed with the function keys, and other keys are used for flaps, undercarriage and fire-extinguishers. The direction, and the rate of climb or descent are controlled by the cursor keys, which is a pity as a joystick would have been better. There are six difficulty levels.

The program is written largely in BASIC, which makes it rather slow to respond to the controls, but it is challenging and fun to play, though more as a game than a serious flight simulation exercise.

Adventure games

Classic adventure games of the Scot Adams type are very popular with those who pride themselves on their lateral thinking. The large scale text-and-graphic games, which have had such success on other machines, are difficult on the C16 because of its limited memory, but text-only adventures are perfectly possible. Many people, in fact, think them superior. Microdeal have released two such games, both in the classic style. By entering two-word commands — generally a verb then a noun — you progress from room to room, meeting hazards and finding clues to the whereabouts of some sort of treasure.

Mansion Adventure 1 is set in a haunted house, where you are trying to find the fabled Mansion Diamond and escape alive. Once I had managed to get into the house — no mean task — I played happily for some time until suddenly...Crash! Syntax Error in Line 51. On investigation, line 51 turned out to be gibberish, as indeed was line 50 as well! The fault was easy to correct, but there is no getting away from the fact that it shouldn't be there at all. I hope Microdeal will do something about it.

In **Williamsburg Adventure 3** you have been transported to America to do battle against a mad butcher, evil spirits and the cops in your search for the Golden Horseshoe. This time the program did not crash, and for less than £4 it is good value for money. The descriptions are somewhat sparse, but nevertheless I found it an enjoyable game to play.

The final game reviewed, again published by Microdeal, is **Cuthbert Enters The Tombs Of Doom.** This is of the type known as an arcade adventure, where you still have to go from room to room, collecting treasures and avoiding hazards, but now you use a joystick as in an arcade game. This particular one is a real star — it amazes me that they have managed to cram so much into 16K of memory. There are over two hundred chambers, bristling with difficulties and complexities, and some truly evil opponents. The graphics and sound are first-rate. You need to watch your oxygen level, keep your lamps filled and collect as much booty as possible, while all the time moving around at great speed. It is far from easy, yet thoroughly compulsive! The cassette comes in quite the grandest packaging I have seen, complete with an instruction booklet and, for some obscure reason, a plastic key-ring. It really is good, and deserves to succeed.

In terms of sales, the C16 has been much more successful than many software producers expected, and they are being forced to latch onto this. I predict that the coming months will see a large amount of high-quality software, bearing in mind that it is easily the most inexpensive home computer on the market. The starter pack is available now for as little as £80! Remember, too, that the Plus/4, which will run C16 games, has also come down in price, increasing the market further.

Things are looking up. Just watch this space!

Mike Roberts' first project in our D.I.Y. add-ons series is a centronics interface for the Commodore 64.

THE HARD FACTS

LAST MONTH'S INTRODUCTION TO the subject of building your own add-ons for the C64 told you about all the preparations you need to make to start.

By now I assume you own a soldering iron, a pair of pliers, some solder, and some clippers or wire strippers – because you need these to construct this month's project, which is a centronics interface for the Commodore 64. This interface is needed because parallel printers are cheaper, more easily available, and a lot better than the equivalent Commodore device. The centronics standard is the only really standard interface in the computer industry. Even so-called standards, such as the RS232 interface can cause problems.

The way the interface works is simple – eight (or even seven) bits of data transmit the characters to the printer. Two handshake lines for information transmission between the two devices, and everything grounded. Thus the minimum configuration is 10 or 11 lines. However for our purposes we will be using a 20 way cable for the 10 information lines and 10 ground lines (one ground line for each information line – it's safer that way).

You may be wondering what a handshake line is. Well, one line links the computer to the printer, and the other goes from the printer to the computer. When the computer puts data onto the data lines it pulses its line to the printer to tell it that it's ready, and waits. When the printer 'sees' this it reads the data off the data lines and prints it; the printer then pulses its handshake line to tell the computer to put more data onto the line, and waits. And so the cycle continues.

The C64's two serial data lines and four handshake lines should now be converted into the previously discussed 10 I/D lines? But, this is not the case. The user port is used on the flip side of the little-used RS232 port on the left hand side of the C64.

This port is already configured as a centronics interface, but Commodore in their infinite wisdom, decided not to provide any connection details or driver software. I hope to remedy this.

The driver software provided is initialised by the now familiar SYS49152. To print you use the command USR in the form 'X=USR(1)' or 'PRINT USR(1)'; to stop printing you use USR again, but with an argument of 0 as in 'PRINT USR(0)' etc.

I chose this system because I wanted a change from the complexities and limitations of having to open a file to the printer; I prefer in most cases the BBC micro method of printing, and it was easier for me to program!. One small point is that the screen goes momentarily 'crazy'. I don't know why this happens, but I think it is something to do with I/O priority. If anybody does know about it – please write to Your Commodore as it would be a great help. Also anything printed while print mode is in operation will be echoed to the screen (although you can't see it while information is being transmitted to the printer!).

There are some limitations to this system, most commercial software may not run or may need some modification.

Construction

Now to connect up. Type in either the BASIC listing or the assembler listing and save it somewhere safe: you must load and run this every time you turn the computer on.

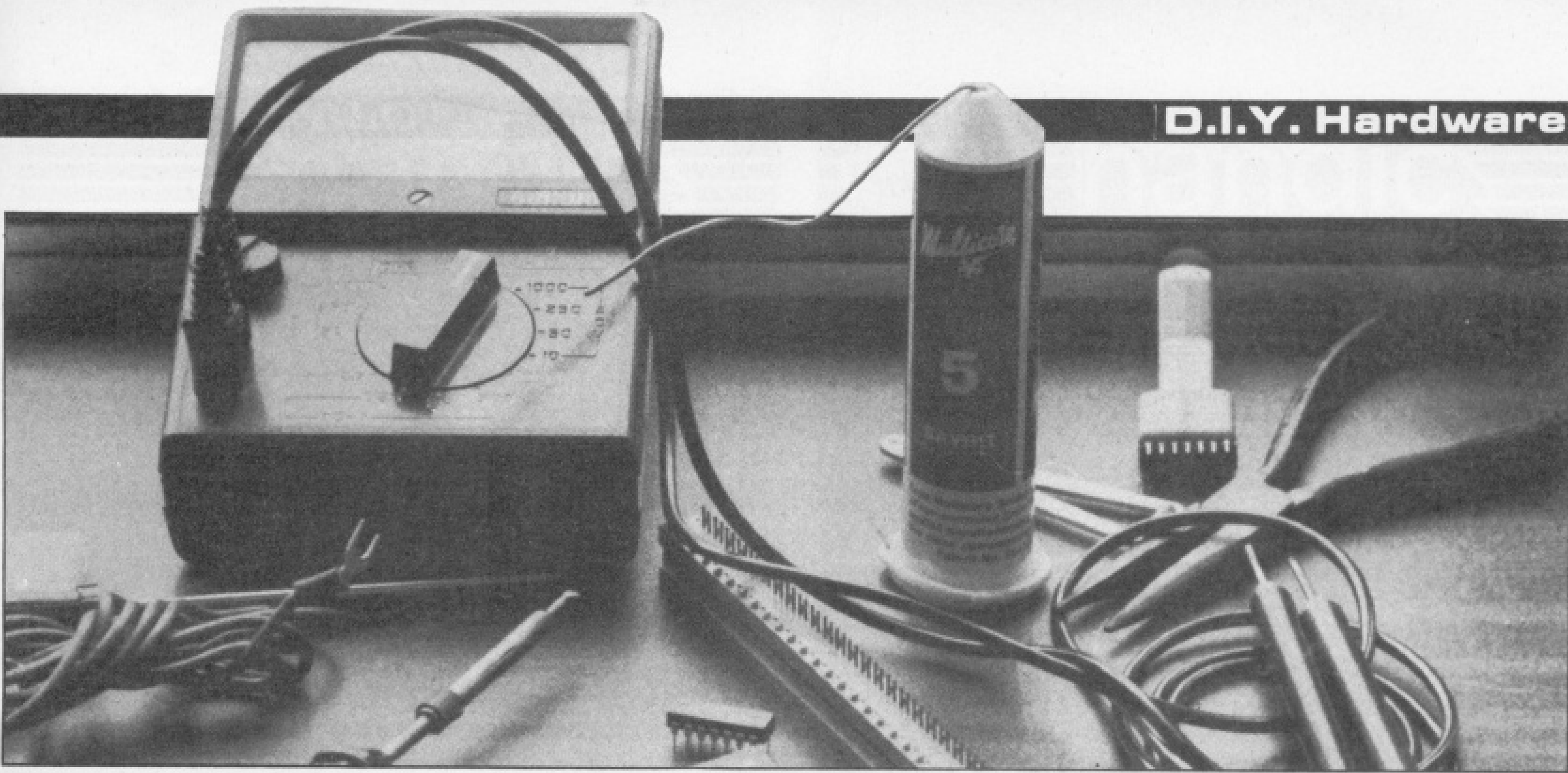
You need a 36 way male Amphenol (insulation displacement type) connector, a 20 way ribbon cable (of any convenient length – about two metres is common), and a 12 way single sided 0.1 inch edge connector. Any reputable electronics supplier should have those in stock but Tandys, Watford Electronics, and Maplin can supply them by mail order if you get into difficulty.

Next you must place the cable flat across the 'teeth' in the Amphenol connector making sure that the red strips in the cable is going to be gripped by pin 1 (the front of the connector is numbered). At this point you will notice that there are 16 spare connections on the Amphenol connector. Do not fear, nobody is really sure why they are there but they're harmless. When the cable is firmly in place, the back of the connector must be pressed on. This is an irreversible action and must be right first time.

At the other end of the cable you must separate out all the wires for about three inches and strip the insulation. Now, every alternate wire must be separated. The odds (ie. the wires that start with the red strips) are data lines and the others are the ground lines. The ground lines must all be soldered together in two bunches onto pins A and N (all alpha designations and positions on the user port are in the back of the manual). Next you must connect the pins of the Amphenol and the edge connector in the following sequence:

B — 11
C — 2
D — 3
E — 4
F — 5
H — 6
J — 7
K — 8
L — 9
M — 1

Now, all you have to do is plug everything in and off you go.



Basic Listing

```
10  rem"**********************************
20  rem"****                          ****
30  rem"****Centronics Driver Software****
40  rem"****                          ****
50  rem"****   (c) Mike Roberts 1985  ****
60  rem"****                          ****
70  rem"**********************************
100 l=49150:ln=995
110 ck=0:ln=ln+5:fori=0to7:reada:ifa=999
thenend
120 pokel,a:l=l+1:ck=ck+a
130 next:readc:ifc<>ckthenprint"you've m
ade a mistake in line"ln"- retype it"
140 goto110
1000 data0,192,162,11,142,17,3,162, 689
1005 data192,142,18,3,96,166,97,224, 938
1010 data129,240,3,76,150,192,162,0, 952
1015 data134,251,162,0,142,1,221,169, 10
80
1020 data0,141,0,221,169,255,141,3, 930
1025 data221,173,2,221,9,4,141,2, 773
1030 data221,169,58,141,38,3,169,192, 99
1
1035 data141,39,3,96,72,169,192,141, 853
1040 data25,3,169,101,141,24,3,104, 570
1045 data141,1,221,72,173,13,221,9, 851
1050 data144,141,13,221,169,4,141,0, 833
1055 data221,169,1,133,251,165,251,201,
1392
1060 data0,208,250,104,76,138,135,72, 98
3
1065 data173,13,221,41,16,208,3,76, 751
1070 data71,254,169,251,141,0,221,169, 1
276
1075 data0,141,1,221,133,251,173,13, 933
1080 data221,41,239,141,13,221,169,254,
1299
1085 data141,25,3,169,71,141,24,3, 577
1090 data169,0,141,13,221,104,88,64, 800
1095 data162,138,142,38,3,162,135,142, 9
22
1100 data39,3,96,0,0,0,0,0, 138
2000 data999

ready.
```

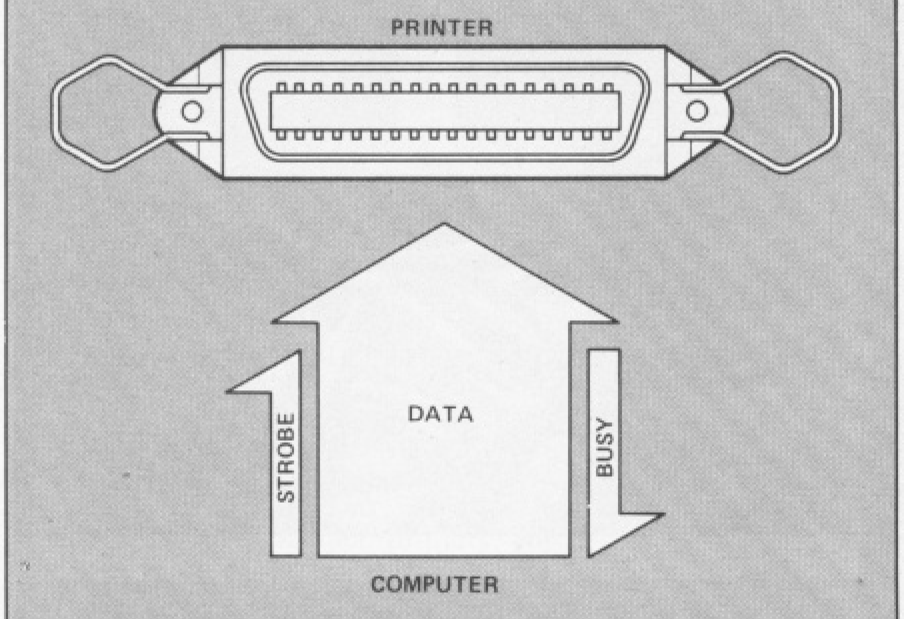


Figure 1 Data flow to printer

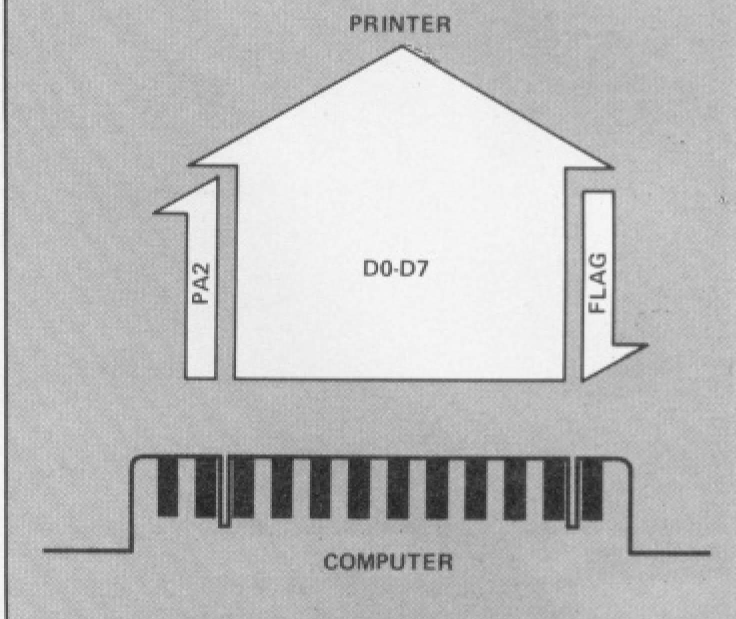


Figure 2 Data flow from computer

Program Listing

```
Centronics Interface      assembler 64 v2.0      page 1

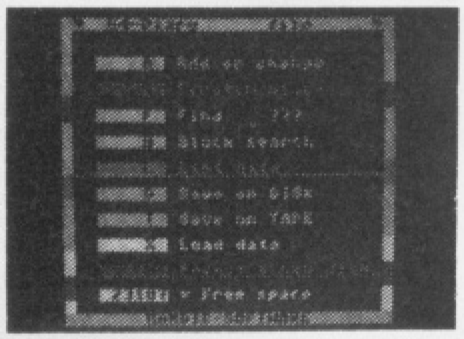
20:     c000                        .tit "Centronics Interface"
30:     c000                        .opt p1
100:    c000                        *=    $c000   ;relocate wherever you like
110:    fe47            oldnmi      =     $fe47
120:    0318            nmivec      =     $0318
130:    878a            chrout      =     $878a
140:    0326            chrvec      =     $0326
160:    dd00            pa2         =     $dd00
170:    dd01            port        =     $dd01
180:    dd03            ddr         =     $dd03
190:    dd02            pa2ddr      =     $dd02
200:    dd0d            flag        =     $dd0d
210:    00fb            busy        =     $fb
220:    0311            usr         =     $0311
400:    c000 a2 0b      init        ldx   #<print
410:    c002 8e 11 03               stx   usr
420:    c005 a2 c0                  ldx   #>print
430:    c007 8e 12 03               stx   usr+1
440:    c00a 60                     rts
450:    c00b a6 61      print       ldx   $61
460:    c00d e0 81                  cpx   #129
470:    c00f f0 03                  beq   start
480:    c011 4c 96 c0               jmp   stopit
500:    c014 a2 00      start       ldx   #$00
510:    c016 86 fb                  stx   busy
550:    c018 a2 00                  ldx   #$00
560:    c01a 8e 01 dd               stx   port
570:    c01d a9 00                  lda   #$00
590:    c01f 8d 00 dd               sta   pa2
600:    c022 a9 ff                  lda   #$ff
610:    c024 8d 03 dd               sta   ddr
620:    c027 ad 02 dd               lda   pa2ddr
630:    c02a 09 04                  ora   #%00000100
640:    c02c 8d 02 dd               sta   pa2ddr
680:    c02f a9 3a                  lda   #<newchr
690:    c031 8d 26 03               sta   chrvec
700:    c034 a9 c0                  lda   #>newchr
710:    c036 8d 27 03               sta   chrvec+1
730:    c039 60                     rts
800:    c03a 48         newchr      pha
805:    c03b a9 c0                  lda   #>newnmi
810:    c03d 8d 19 03               sta   nmivec+1
820:    c040 a9 65                  lda   #<newnmi
830:    c042 8d 18 03               sta   nmivec
840:    c045 68                     pla
850:    c046 8d 01 dd               sta   port
860:    c049 48                     pha
880:    c04a ad 0d dd               lda   flag
```

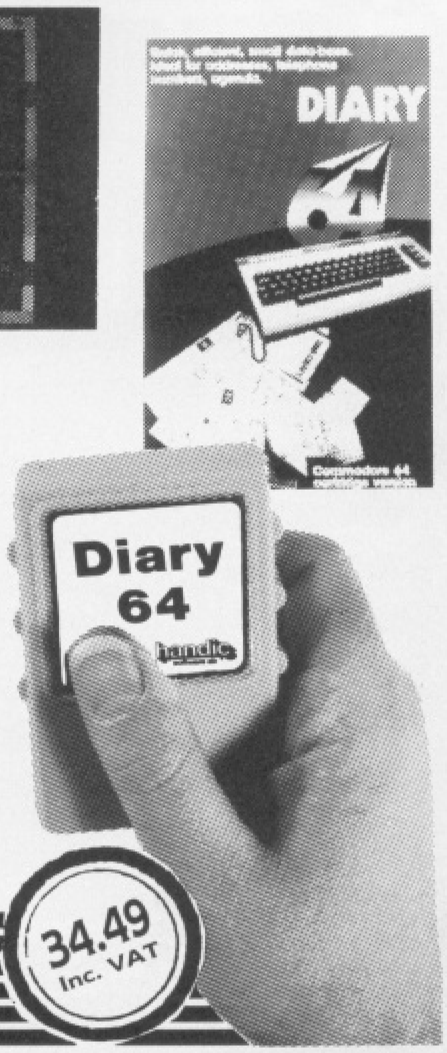
```
890:    c04d 09 90                  ora   #%10010000
900:    c04f 8d 0d dd               sta   flag
910:    c052 a9 04                  lda   #%00000100
930:    c054 8d 00 dd               sta   pa2
940:    c057 a9 01                  lda   #$01
950:    c059 85 fb                  sta   busy
952:    c05b a5 fb      loop        lda   busy
954:    c05d c9 00                  cmp   #$00
956:    c05f d0 fa                  bne   loop
960:    c061 68                     pla

Centronics Interface      assembler 64 v2.0      page 2

970:    c062 4c 8a 87               jmp   chrout
1000:   c065 48         newnmi      pha
1005:   c066 ad 0d dd               lda   flag
1010:   c069 29 10                  and   #%00010000
1020:   c06b d0 03                  bne   handshake
1030:   c06d 4c 47 fe               jmp   oldnmi
1035:   c070 a9 fb      handshakelda      #%11111011
1060:   c072 8d 00 dd               sta   pa2
1070:   c075 a9 00                  lda   #$00
1075:   c077 8d 01 dd               sta   port
1080:   c07a 85 fb                  sta   busy
1090:   c07c ad 0d dd               lda   flag
1100:   c07f 29 ef                  and   #%11101111
1110:   c081 8d 0d dd               sta   flag
3000:   c084 a9 fe      endit       lda   #>oldnmi
3010:   c086 8d 19 03               sta   nmivec+1
3020:   c089 a9 47                  lda   #<oldnmi
3030:   c08b 8d 18 03               sta   nmivec
3040:   c08e a9 00                  lda   #$00
3050:   c090 8d 0d dd               sta   flag
3080:   c093 68                     pla
3090:   c094 58                     cli
3100:   c095 40                     rti
4000:   c096 a2 8a      stopit      ldx   #<chrout
4010:   c098 8e 26 03               stx   chrvec
4020:   c09b a2 87                  ldx   #>chrout
4030:   c09d 8e 27 03               stx   chrvec+1
4040:   c0a0 60                     rts
] c000-c0a1
```

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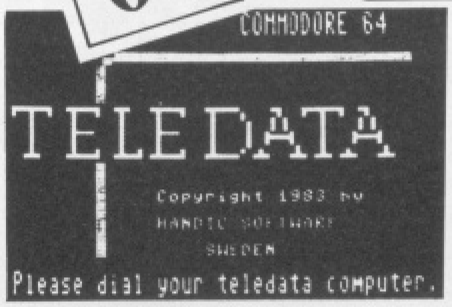
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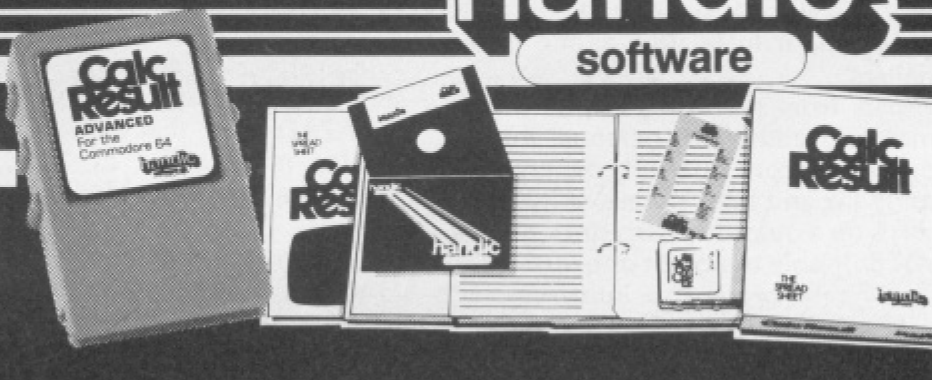
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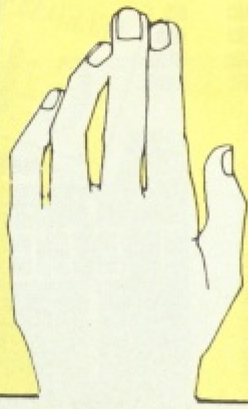
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BUSINESS FILE



Dave Crisp gets up-to-date with the latest in diary systems for the Commodore 64.

DIARY SYSTEMS ARE CURRENTLY IN vogue and, thus, are now included in the firmware of many PCs. The value to the user of such a system depends largely upon the individual but I think the advantage of a computer-based diary is lost if it is not kept continually on-line.

The two packages reviewed here are very different. They are Desk Diary from AZAD and CBM-64-Diary, from Handic of Stockholm. Both systems compete quite well with similar systems which I have seen running on much larger machines than the Commodore 64.

Desk Diary

This comes on two discs (program and data) and is accompanied by a truly comprehensive and professionally presented user guide (50 pages, including a workable index).

Once the program is loaded, the user is asked to enter a password followed by the date and time. In fact, the time is of little value since it never coincides with your watch; it loses time as the system initialises.

Apart from recording appointments, names and addresses, personal memos, etc., it can record quarterly expenditure, income tax and bank details. It maintains records on a quarterly basis since the data disc is only able to accept one quarter at a time. The software also interfaces with Easy File, Easy Calc and Easy Script (2-way compatible) which should make it additionally attractive to Commodore software users.

An 'appointments window', situated at the top right of the opening menu, provides for a rolling display of 10 days records, with display starting from the Sunday prior to the date entered on load-up. The pointer is easily manipulated by the cursor control keys. Similarly, '+' and '-' commands allow the window to jump ahead or back in sets of 10 days.

Entries are easily maintained and inserted. They are saved to disc or created in Easy Script format by use of the F2 and F8 keys respectively.

Other data items are created and held just as easily, although there are restrictions on the amount that can be held (e.g. only 4 pages are devoted to telephone numbers and addresses). But there should be sufficient space available for even the most devoted diarist.



64-Diary

The search and analysis facilities are comprehensive, allowing for event recall as well as date and text searches.

AZAD claim that entries can be made as far in advance as 1992, although calendars are available as far ahead as 2057.

The system is written in 6502 assembly language to keep up performance levels and is completely menu drive. The screen layouts are both clear and precise.

Overall, this is a sophisticated and potentially useful addition to any small computer configuration.

CBM-64 Diary

This package is neatly marketed and, as with the majority of cartridge-based systems, loads almost instantaneously. The manual is very sparse but the software is so easy to run and use that a detailed manual is hardly necessary.

64-Diary is more a data storage and retrieval system than a fully-fledged diary. Data is held in blocks (10 lines of 27 characters) and is entered and retrieved as free-form strings. The user can optionally use block numbers (think of a block as a screenful) or dates as keys to records. Text searches are quick and responsive.

This system does not pretend to be as all-encompassing as Desk Diary but, if you merely need to store data and dates (on an annual basis), it is simple to use and fairly versatile.

Conclusion

On balance, Desk Diary offers greater value for money since it offers more comprehensive services. But the system is a little cumbersome and requires regular maintenance to ensure that the best possible results are achieved. Your choice of system must depend on the use to which you are to put the package.

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Price £34.49
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Berkshire
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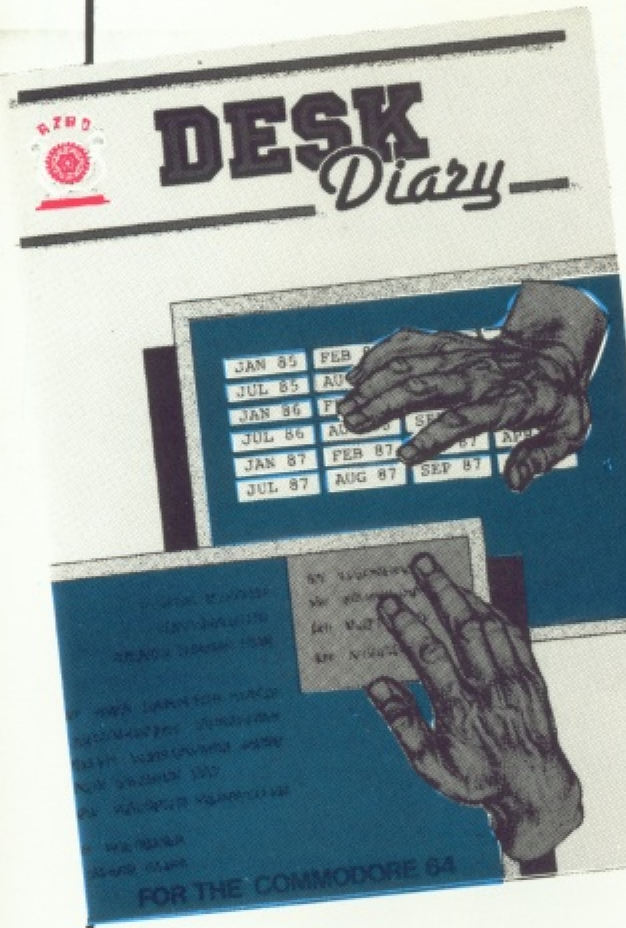
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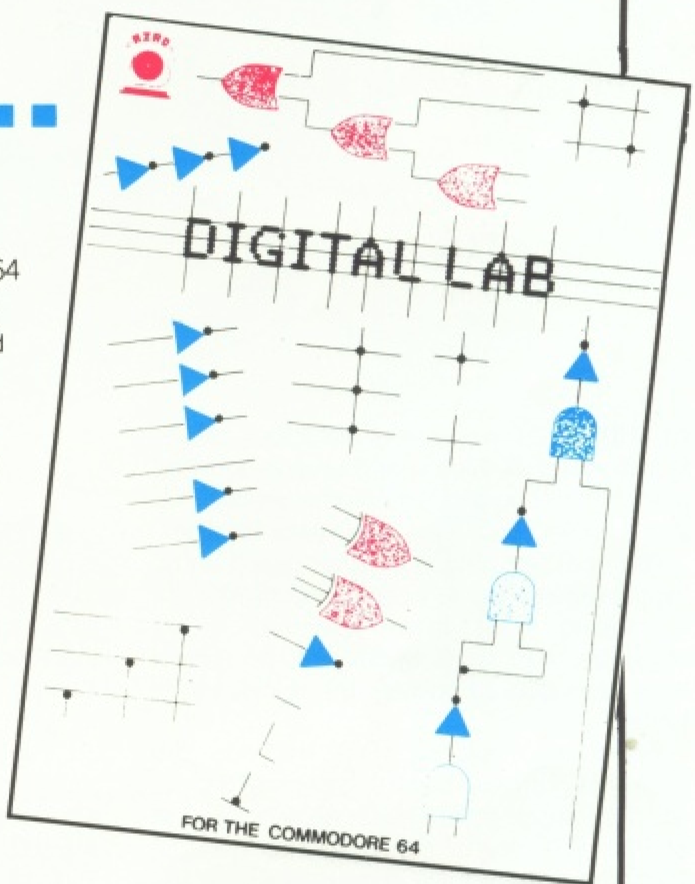
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